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## 70-10

Proceedings of the American Academy of Arts and Sciences

VOL. 70, No. 10—MARCH, 1936

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RECORDS OF MEETINGS, 1934-35

BIOGRAPHICAL NOTICES

OFFICERS AND COMMITTEES FOR 1935-1936

LIST OF THE FELLOWS AND FOREIGN HONORARY  
MEMBERS

STATUTES AND STANDING VOTES

RUMFORD PREMIUM

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## VOLUME 70.

1. BRIDGMAN, P. W.—The Melting Curves and Compressibilities of Nitrogen and Argon. pp. 1-32. March, 1935. \$0.65.
2. WHEELER, WILLIAM MORTON, MACCOY, CLINTON V., GRISCOM, LUDLOW, ALLEN, GLOVER M., AND COOLIDGE, HAROLD J., JR.—Observations on the Behavior of Animals During the Total Solar Eclipse of August 31, 1932. pp. 33-70. March, 1935. \$0.75.
3. BRIDGMAN, P. W.—Measurements of Certain Electrical Resistances, Compressibilities, and Thermal Expansions to 20000 kg/cm<sup>2</sup>. pp. 71-101. April, 1935. \$0.75.
4. CARPENTER, FRANK M.—The Lower Permian Insects of Kansas. Part 7. The Order Protoperlaria. pp. 103-146. May, 1935. \$0.90.
5. SMITH, LYMAN B.—Studies in the Bromeliaceae, VI. pp. 147-220. August, 1935. \$1.35.
6. WU, LU-CH'ANG AND DAVIS, TENNEY L.—Ko Hung on the Gold Medicine and on the Yellow and the White. pp. 221-284. December, 1935. \$1.25.
7. BRIDGMAN, P. W.—Compressibilities and Electrical Resistance under Pressure, with special reference to Intermetallic Compounds. pp. 285-317. December, 1935. \$0.75.
8. KEYES, FREDERICK G., SMITH, LEIGHTON B., AND GERRY, HAROLD T.—The Specific Volume of Steam in the Saturated and Superheated Condition Together With Derived Values of the Enthalpy, Entropy, Heat Capacity and Joule Thomson Coefficients. Part IV. Steam Research Program. pp. 319-364. February, 1936. \$1.00.
9. BRUES, CHARLES T.—Philippine Phoridae from the Mount Apo Region in Mindanao. pp. 365-466. February, 1936. \$1.50.
10. RECORDS OF MEETINGS; Biographical Notices; Officers and Committees; List of Fellows and Foreign Honorary Members; Statutes and Standing Votes, etc.; pp. 467-672. March, 1936. \$2.25.





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RECORDS OF MEETINGS, 1934-35

BIOGRAPHICAL NOTICES

OFFICERS AND COMMITTEES FOR 1935-1936

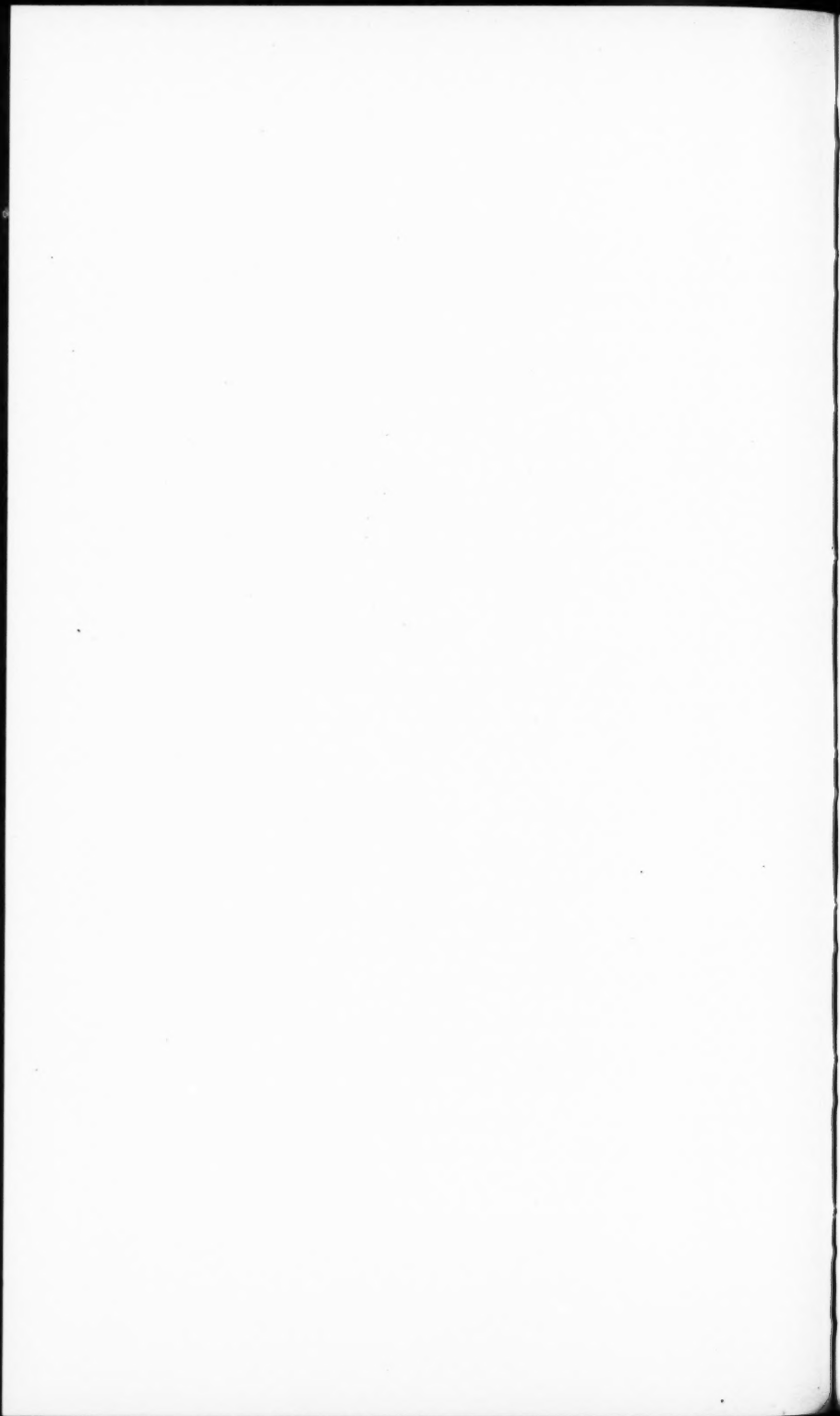
LIST OF THE FELLOWS AND FOREIGN HONORARY  
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## RECORDS OF MEETINGS

### One Thousand Two Hundred and Sixteenth Meeting

OCTOBER 10, 1934—STATED MEETING

The Academy met at its House at 8.20 P. M.

The PRESIDENT in the Chair.

There were present eighty Fellows and four guests.

The records of the annual meeting of May 9 were read and approved.

The Corresponding Secretary reported the receipt of letters accepting Fellowship from Edgar Anderson, C. G. Campbell, J. M. Clark, C. J. Connick, F. H. Crawford, O. G. C. Dahl, S. F. Damon, W. M. Daniels, C. L. Dawes, J. P. Den Hartog, J. F. Ebersole, G. C. Evans, S. P. Fergusson, C. H. Fiske, R. E. Freeman, J. F. Fulton, E. S. Furniss, R. M. Haig, A. M. Harmon, Hudson Hoagland, J. C. Hunsaker, Henry Jackson, Jr., D. F. Jones, M. B. Jones, E. W. Kemmerer, H. P. Kendall, R. G. Kent, F. H. Knight, Kurt Koffka, C. C. Little, R. M. MacIver, L. W. McKeehan, D. H. Menzel, R. S. Meriam, H. A. Millis, H. R. Mimno, L. M. S. Miner, A. E. Monroe, E. L. Moreland, P. M. Morse, W. H. Newhouse, E. G. Nourse, W. A. Oldfather, Leigh Page, R. H. Pfeiffer, W. C. Quinby, A. N. Richards, Oscar Riddle, D. M. Robinson, C. G. A. Rossby, A. H. Ruggles, E. H. Schell, T. L. Shear, E. W. Sinnott, G. M. Smith, L. B. Smith, F. J. Teggart, L. M. Terman, C. F. Thwing, E. L. Thorndike, J. H. Van Vleck, Jacob Viner, Leo Wolman, D. E. Worrall, L. C. Wroth, and C. C. Zimmerman; of letters accepting Foreign Honorary Membership from Gustav Cassel, R. A. Fisher, A. V. Hill, Arthur Holmes, Paul Janet, Serge Koussevitzky, Luigi Lombardi, P. B. Struve, and Richard Willstätter; also of letters declining Fellowship from A. G. Keller and S. H. Schlichter; and of letters resigning Fellowship from G. L. Hosmer and R. L. O'Brien.

The Corresponding Secretary announced that the Council had made the following grants from the Permanent Science Fund:

1. A grant of \$300 to Joseph A. Cushman, Director of the Cushman Foraminiferal Laboratory, Sharon, Mass., to assist in preparing slides of the foraminiferal fauna from the samples obtained by the ship "Atlantis" belonging to the Oceanographic Institute.

2. A grant of \$750 to C. V. Green and C. C. Little, Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine, for the care of experimental animals and the preparation and study of microscopic sections of tumors in their work on cancer research.

3. A grant of \$250 to William J. Luyten, Associate Professor of Astronomy, University of Minnesota, to be spent on technical assistance in an investigation of the proper motions of faint stars in the southern hemisphere.

4. A grant of \$375 to Bret Ratner, Clinical Professor of Pediatrics and Lecturer in Immunology, New York University and Bellevue Medical College, to aid in the continuation of his experiments on asthma in the guinea pig.

5. A grant of \$100 to Roberts Rugh, Hunter College, New York City, for the purchase of material needed for the study of induced ovulation and egg transport in the Urodeles and for the preparation of moving picture films of this process.

6. A grant of \$300 to Mrs. Mabel Ruttle Nebel of the New York Agricultural Experiment Station, Geneva, N. Y., to make it possible for her to continue her study of the chromosome matrix in plants of *Allium*, *Crepis*, *Hordeum*, *Tradescantia*, and *Zea* under various temperatures and nutritive conditions.

7. A grant of \$250 to Karl Sax, Associate Professor of Plant Cytology, Harvard University, as a contribution of one-half the cost of building a constant temperature chamber, where the effect of variations between 5° and 40° C. on certain cytological processes can be studied.

8. A grant of \$100 to Harry R. De Silva, Professor of Psychology, Massachusetts State College, Amherst, to assist in the purchase of electrical supplies to finish an A.C. bridge and to improve a D.C. bridge, which will be used to study any existing relations between metabolism as measured by the gasometric method, body voltage as measured by the D.C. bridge, and body impedance as measured by the A.C. bridge.

9. A grant of \$750 to V. M. Slipper, Director of the Lowell Observatory, Flagstaff, Arizona, to aid in continuing his work on the spectra of the planets.

The President announced the death of seven Fellows:—Nathaniel Lord Britton (Class II, Section 2), George Cary Comstock (Class I,

Section 1), Richard Thornton Fisher (Class II, Section 2), Henry Roseman Lang (Class IV, Section 3), Odin Roberts (Class III, Section 1), George Byron Roorbach (Class III, Section 3), William Hultz Walker (Class I, Section 3).

The Fellows elected in May were then presented to the Academy.

The following communication was presented:

Mr. Leigh Hoadley: "The Experimental Analysis of Animal Development," with lantern illustrations.

The following papers were presented by title: "A Study of the Ant Genera *Novomessor* and *Veromessor*," by W. M. Wheeler and W. S. Creighton; "The Apparatus and Method used for the Measurement of the Compressibility of Several Gases in the Range 0° to 325° C.," by J. A. Beattie; "New Bands of the Ionized Nitrogen Molecule," by F. H. Crawford and P. M. Tsai; "The Relation of the Eyes to Chromatophoral Activities," by G. H. Parker, F. M. Brown, Jr., and J. M. Odiorne; "The Melting Curves and Compressibilities of Nitrogen and Argon," by P. W. Bridgman.

The meeting was dissolved at 9.50 P. M.

#### One Thousand Two Hundred and Seventeenth Meeting

NOVEMBER 14, 1934—STATED MEETING

The Academy met at its House at 8.25 P. M.

The PRESIDENT in the Chair.

There were present sixty-three Fellows and ten guests.

The records of the meeting of October 10 were read and approved.

The Corresponding Secretary reported the receipt of a letter from Robert E. Park accepting election as a Fellow.

He also announced the appointment of Professor Arthur E. Kennelly to continue as representative of the Academy in the Division of Foreign Relations of the National Research Council for the three-year period ending June 30, 1937; and of Professor Henri Pirenne as delegate of the Academy at the celebration of the Centenary of the Founding of the Royal Commission of History of Belgium at Brussels, November 28, 1934.

The President announced the following deaths: Samuel Parsons Mulliken (Class I, Section 3) and Raymond Poincaré, Foreign Honorary Member in Class III, Section 4.

The following communication was presented:

Mr. P. A. Sorokin: "The Movement of Internal Disturbances in the History of Ancient Greece, Rome, Byzantium, and Seven of the Main European Countries," with lantern illustrations.

The meeting was dissolved at 9.50 P. M.

**One Thousand Two Hundred and Eighteenth Meeting**

DECEMBER 12, 1934—STATED MEETING

The Academy met at its House at 8.25 P. M.

The PRESIDENT in the Chair.

There were present forty-two Fellows and four guests.

The records of the meeting of November 14 were read and approved.

The President announced the death of four Fellows: Gilman Arthur Drew (Class II, Section 3), Ernest Gale Martin (Class II, Section 3), Allan Winter Rowe (Class I, Section 3), Theobald Smith (Class II, Section 4); and of one Foreign Honorary Member, Willem de Sitter (Class I, Section 1).

The following communication was presented:

Mr. W. Lloyd Warner: "The Religion of a Stone Age People."

One paper was read by title: "Measurements of Certain Resistances, Compressibilities, and Thermal Expansions to 20,000 Kilograms per Square Centimeter," by P. W. Bridgman.

The meeting was dissolved at 9.50 P. M.

**One Thousand Two Hundred and Nineteenth Meeting**

JANUARY 9, 1935—STATED MEETING

The Academy met at its House at 8.15 P. M.

The PRESIDENT in the Chair.

There were present fifty-one Fellows and eight guests.

The records of the meeting of December 12 were read and approved.

The President announced the death of two Fellows: George Pierce Baker (Class IV, Section 4) and Roland Burrage Dixon (Class IV, Section 2); and of two Foreign Honorary Members: Mineichiro Adatci (Class III, Section 2) and Georg Elias Müller (Class IV, Section 1).

On the recommendation of the Council an additional appropriation was made of fifteen dollars for Library expenses from the General Fund for the current year.

The following communication was presented:

Mr Arthur Loveridge: "The Kruger National Park and a Visit to Mount Debasien and Mount Elgon, Uganda," illustrated with motion pictures.

The following paper was read by title: "The Dependence on the Boundary of the Boundary Values of the Potential and its Derivatives," by Oliver D. Kellogg and Mildred M. Sullivan.

The meeting was dissolved at 9.50 P. M.

**One Thousand Two Hundred and Twentieth Meeting**

FEBRUARY 13, 1935—STATED MEETING

The Academy met at its House at 8.25 P. M.

VICE-PRESIDENT CANNON in the Chair.

There were present fifty-five Fellows and three guests.

The records of the meeting of January 9 were read and approved.

The Corresponding Secretary reported the receipt of a letter from Mr. Charles J. Bullock, resigning Fellowship.

He also announced the receipt from the Belgian Royal Commission of History of a silver medal commemorating its Centennial Celebration.

The Vice-President announced the death of three Fellows: Herdman Fitzgerald Cleland (Class II, Section 1), William Cushing Wait (Class III, Section 1) and James Houghton Woods (Class IV, Section I).

The following communication was presented:

Mr. Earnest A. Hooton: "Man's Past, Present, and Future."

Three papers were read by title: "Observations on the Behavior of Animals during the Total Solar Eclipse of August 31, 1932," by William Morton Wheeler, Clinton V. MacCoy, Ludlow Griscom, Glover M. Allen, and Harold J. Coolidge, Jr.; "Hecataeus and the Egyptian Priests in Herodotus, Book II," by William Arthur Heidel; "The Lower Permian Insects of Kansas, Part 7," by F. M. Carpenter.

The meeting was dissolved at 9.50 P. M.

**One Thousand Two Hundred and Twenty First Meeting**

MARCH 13, 1935—STATED MEETING

The Academy met at its House at 8.30 P. M.

The PRESIDENT in the Chair.

There were present forty-four Fellows and two guests.

The records of the meeting of February 13 were read and approved.

The Corresponding Secretary announced that the President had appointed William H. Weston, Jr. and Karl Sax to represent the Academy at the Sixth International Botanical Congress, to be held at Amsterdam in September 1935; and Maurice Caullery to act as delegate to the Tercentenary Celebration of the National Museum of Natural History, Paris, to be held in June 1935.

The President announced the death of five Fellows: William Duane (Class I, Section 2), Ephraim Emerton (Class IV, Section 2), Michael Idvorsky Pupin (Class I, Section 2), Jeremiah Smith, Jr. (Class III, Section 4) and David White (Class II, Section 1).

The President appointed the Nominating Committee as follows:

Harry E. Clifford, of Class I  
Oakes Ames, of Class II  
George G. Wilson, of Class III  
Charles Hopkinson, of Class IV

On the recommendation of the Council the following appropriations were made for the ensuing year:

From the income of the General Fund, \$7,575, to be used as follows:

for General and Meeting expenses . . . . .	\$ 800
for Library expenses . . . . .	2,200
for Books, Periodicals, and Binding . . . . .	1,500
for House expenses . . . . .	2,000
for Treasurer's expenses . . . . .	1,050
for use at the discretion of the President . . . . .	25

From the income of the Publication Funds, \$2,645.52, to be used for publication.

From the income of the Rumford Fund, \$3,230, to be used as follows:

for Research . . . . .	\$ 2,000
for Books, Periodicals, and Binding . . . . .	350
for use at the discretion of the Committee . . . . .	880

From the income of the C. M. Warren Fund, \$900, to be used at the discretion of the Committee.

The following communication was presented:

Mr. Tenney L. Davis: "Ko Hung, Chinese Alchemist of the Fourth Century," illustrated with lantern slides.

One paper was read by title: "Studies in the Bromeliaceae. VI," by Lyman B. Smith, presented by B. L. Robinson.

The meeting was dissolved at ten P. M.

**One Thousand Two Hundred and Twenty Second Meeting**

APRIL 10, 1935—STATED MEETING

The Academy met at its House at 8.25 P. M.

The PRESIDENT in the Chair.

There were present thirty-eight Fellows and six guests.

The records of the meeting of March 13 were read and approved.

The Corresponding Secretary reported that the Council had made the following grants from the Permanent Science Fund:

1. To Frank M. Carpenter, Museum of Comparative Zoology, Cambridge, \$350, for expenses in connection with a collecting expedition to Kansas for the purpose of adding material necessary for his work on a Revision of the Lower Permian Insects of Kansas.

2. To Tenney L. Davis, Massachusetts Institute of Technology, \$300, for technical assistance in the preparation and analysis of certain compounds essential to the completion of his study of the reactions of phosphorus trichloride with cuprous chloride.

3. To Fred W. Emerson, New Mexico Normal University, Las Vegas, \$100, for aid in defraying expenses in connection with the study of the plant associations in the White Sands area near Alamogordo, N. M., and in collecting material for the study of palisade cells in desert plants

4. To Walter S. Hunter, Clark University, Worcester, \$150, for apparatus, assistance, and other expenses to be incurred in investigating the inhibition and disinhibition of conditioned reflexes in human subjects.

5. To J. W. McBain, Stanford University, Cal., \$250, for materials and equipment to be used in a study of adsorption in the air-water interface of various solutions.

6. To Arthur H. Graves, Brooklyn Botanic Garden, N. Y., \$250, to help meet expenses in an investigation designed to produce a chestnut resistant to *Endothia parasitica*.

7. To Professor Robert Weill, of the Faculty of Sciences of the University of Paris, \$300, for aid in defraying expenses of a visit to

the Bermuda Biological Station to study the nematocysts of Coelenterates.

It was also announced that the President had appointed Professor Maurice Caullery as delegate to the celebration of the Third Centenary of the Muséum d'Histoire Naturelle, Paris, on June 24, 1935; and Dr. William Morton Wheeler as delegate to the Twelfth International Zoological Congress at Lisbon in September 1935.

The President announced the death of two Fellows: George Hoyt Bigelow (Class III, Section 4) and Edwin Arlington Robinson (Class IV, Section 4).

The following communication was presented:

Mr. William J. Crozier: "Determinism and Biological Variability," illustrated with lantern slides.

The meeting was dissolved at 9.40 P. M.

#### **One Thousand Two Hundred and Twenty Third Meeting**

MAY 8, 1935—ANNUAL MEETING

The Academy met at its House at 8.20 P. M.

The PRESIDENT in the Chair.

There were present sixty-two Fellows and seven guests.

The records of the meeting of April 10 were read and approved.

The Corresponding Secretary reported the receipt of a letter from Dr. Milton J. Rosenau resigning Fellowship.

The following report of the Council was presented:

#### **REPORT OF THE COUNCIL**

Since the last report of the Council there have been reported the deaths of twenty-four Fellows:—George Pierce Baker, George Hoyt Bigelow, Nathaniel Lord Britton, Herdman Fitzgerald Cleland, George Cary Comstock, Roland Burrage Dixon, Gilman Arthur Drew, William Duane, Ephraim Emerton, Richard Thornton Fisher, Henry Roseman Lang, Ernest Gale Martin, Samuel Parsons Mulliken, Michael Idvorsky Pupin, Odin Roberts, Edwin Arlington Robinson, George Byron Roorbach, Allan Winter Rowe, Jeremiah Smith, Jr., Theobald Smith, William Cushing Wait, William Hultz Walker, David White, James Haughton Woods; and four Foreign Honorary Members:—Mineichiro Adatci, Georg Elias Müller, Raymond Poincaré, Willem de Sitter.

Seventy Fellows and nine Foreign Honorary Members were elected by the Council and announced to the Academy in May 1934.

The roll now includes 761 Fellows and 121 Foreign Honorary Members (not including those elected in May 1935).

The annual report of the Treasurer, Ingersoll Bowditch, was read, of which the following is an abstract:

## GENERAL FUND

*Receipts*

Income on hand April 1, 1934 . . . . .		\$3,642.28	
From Investments . . . . .	\$2,740.33		
From Assessments . . . . .	4,090.00		
From Admissions . . . . .	340.00		
From Rumford Fund Income . . . . .	200.00	7,370.33	\$11,012.61

*Expenditures*

Assistant Librarian . . . . .	\$2,000.00		
Expenses of Library . . . . .	66.17		
Treasurer's Expenses . . . . .	940.90		
Books and Binding . . . . .	1,546.90		
General Expenses . . . . .	840.75		
House Expenses . . . . .	2,354.15		
President's Expenses . . . . .	20.00	\$7,768.87	
Income transferred to Principal . . . . .		355.75	\$ 8,124.62

## RUMFORD FUND

*Receipts*

Income on hand April 1, 1934 . . . . .	\$ 640.28		
From Investments . . . . .	3,401.00	\$ 4,041.28	

*Expenditures*

Purchase and Binding of Books . . . . .	\$ 444.44		
Research . . . . .	2,629.28		
Transferred to General Fund Income for care of books . . . . .	200.00		
Transferred to Publication Account. . . . .	150.00	\$3,423.72	
Income transferred to Principal . . . . .		170.00	\$ 3,593.72

## PUBLICATION ACCOUNT

*Receipts*

Income on hand April 1, 1934 . . . . .		\$3,781.43	
From Income—Appleton Fund . . .	\$1,135.92		
From Income—Centennial Fund . . .	1,740.56		
From Income—Rumford Fund . . . .	150.00		
From Authors' Reprints . . . . .	1.50		
From Sale of Publications . . . . .	380.56		
From Grants and Donations . . . . .	600.00		
From Amer. Council of Learned Societies a/c Lake Publication Fund . . . . .	4,000.00		
From Lake Fund subscriptions . . .	1,053.03	9,061.57	\$12,843.00
		<hr/>	

*Expenditures*

## Publications—

General Fund	\$4,013.63		
Rumford Fund	399.89		
Lake Fund . . . . .	5,753.86	\$10,167.38	
Vault Rent—part . . . . .	4.40	\$10,171.78	
		<hr/>	
Interest on Bonds bought . . . . .	\$ 22.69		
Income transferred to Principal . . .	130.80	153.49	\$10,325.27
		<hr/>	

## C. M. WARREN FUND

*Receipts*

Income on hand April 1, 1934 . . . . .	\$ 21.29		
From Investments . . . . .	933.90	\$ 955.19	

*Expenditures*

Research . . . . .	\$ 751.50		
Vault rent—part . . . . .	2.20	\$ 753.70	
		<hr/>	
Interest on Bonds bought . . . . .	\$ 2.08		
Income transferred to Principal . . .	43.25	45.33	\$ 799.03

## FRANCIS AMORY FUND

*Receipts*

Income on hand April 1, 1934 . . . . .	\$ 873.97	
From Investments . . . . .	2,781.20	\$3,655.17

*Expenditures*

Publishing Statement . . . . .	\$ 75.75	
Interest on Bonds bought . . . . .	17.66	
Vault rent—part . . . . .	6.60	\$ 100.01

## PERMANENT SCIENCE FUND

*Receipts*

Income on hand April 1, 1934 . . . . .	\$1,000.00	
Received for above fund . . . . .	6,315.00	\$7,315.00

*Expenditures*

Grants from above fund . . . . .		\$7,065.00
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The following reports were also presented:

## REPORT OF THE LIBRARY COMMITTEE

During the year 95 volumes and 17 unbound numbers of serials have been borrowed by 10 Fellows and 12 libraries, and more have been consulted at the Academy. All books taken out have been returned or satisfactorily accounted for, with one exception, and this we expect to adjust on the borrower's return from abroad.

The number of volumes on the shelves at the time of the last report was 43,946. During the year 400 volumes were added, largely by binding serials, making the number now 44,346. This includes 43 purchased from the General Fund, 25 from the Rumford Fund, and 332 received by gift or exchange.

Mrs. M. F. Ball, who is the working librarian, has continued her regular and intelligent service throughout the year. During her twelve and one-half years service she has not been absent through sickness. She helps in the conduct of Academy affairs in many ways beyond a librarian's routine duties.

The following appropriations were placed at the disposal of the Librarian during the past year:

Balance from General Fund . . . . .	\$ 429.61	
Balance from Rumford Fund . . . . .	160.92	
Appropriation from General Fund . . . . .	3,515.00	
Appropriation from Rumford Fund . . . . .	350.00	
		<hr/>
Total . . . . .	\$4,455.53	

The expenses charged to the library during the financial year ending March 31, 1935, were:

Salaries . . . . .		\$2,000.00
Binding:		
General Fund . . . . .	\$ 537.30	
Rumford Fund . . . . .	74.95	612.25
		<hr/>
Purchase of Books and Periodicals:		
General Fund . . . . .	\$1,009.60	
Rumford Fund . . . . .	369.49	1,379.09
		<hr/>
Miscellaneous . . . . .		66.17
		<hr/>
		\$4,057.51

There remained an unexpended balance of \$398.02, as follows:

General Fund . . . . .	\$ 331.54
Rumford Fund . . . . .	66.48
	<hr/>
	\$ 398.02

In accordance with the usual custom this balance will be carried over to next year. Moreover I think that in view of uncertainties of exchange and other factors, I shall ask for \$100.00 more than last year to be used if needed.

Respectfully submitted,

ALFRED C. LANE, *Librarian*.

May 8, 1935.

## REPORT OF THE RUMFORD COMMITTEE

The Rumford Committee held four meetings during the Academy year (April 1, 1934 to March 31, 1935) on April 11, October 10, December 12, 1934, and February 13, 1935.

The Committee made the following grants, during the year, from the Rumford Fund, in aid of researches in light and heat.

<i>1934</i>	<i>No.</i>		<i>Amount</i>
Apr. 11	314	Prof. P. W. Bridgman, Harvard University, for Equipment in Researches on Thermal and Optical Properties of Matter . . . . .	\$ 400
Apr. 11	315	Prof. J. C. Stearns, University of Denver, for Equipment in Cosmic-ray Research . . . . .	300
Apr. 11	316	Dr. C. E. Bennett, Mass. Inst. of Technology, for Equipment in Research on Refractive Index of Gases under Varied Impressed Conditions . . . . .	400
Oct. 10	317	Prof. D. C. Stockbarger, Mass. Inst. of Tech., for Equipment in Research on Growth of Optical Crystals . . . . .	400
Oct. 10	318	Dr. C. E. Tester Jr., 109 Maple St., Waverly, Mass., for equipment in Research on the Joule-Thomson Effect . . . . .	100
Dec. 12	319	Dr. Bart J. Bok, Harvard University, for Equipment in Research on Radial Velocities in the Spectra of Faint Stars . . . . .	400
<i>1935</i>			
Feb. 13	320	Prof. J. R. Roebuck, University of Wisconsin, for Equipment in Research on Thermal Properties of Gases . . . . .	149.36
Feb. 13	321	Dr. J. A. Bearden, Johns Hopkins University, for Equipment in Research on X-rays . . . . .	400
Total . . . . .			\$2,549.36

It may be mentioned that the research of Grant No. 317 (\$400) in the foregoing list, in conjunction with Grant No. 302 (\$500) of Decem-

ber 14, 1932, has eventuated in an application for U. S. Letters Patent. So far as we have information, this is the first scientific research aided by a Rumford Grant that has led to a patent application since the Academy appointed the Rumford Standing Committee in 1833. At the request of the Council, the Committee has covered the matter in a brief special report to the President and Council, dated April 30, 1935.

The following recent publications concern researches aided by Rumford Grants.

P. W. Bridgman—"The Melting Curves and Compressibilities of Nitrogen and Argon." *Proc. Am. Acad. Arts and Sciences*, Vol. 70, No. 1, March 1935.

R. H. Frazier—"Precise Speed Control for D-C Machines." *Electrical Engineering*, March 1935.

W. R. Fredrickson, C. R. Stannard—"Magnetic Rotation Spectrum of the Red Bands of Sodium." *Physical Review*, Vol. 44, pp. 632-637, Oct. 15, 1933.

Willi M. Cohn—"Preliminary Report of the Expeditions for Observing the Total Solar Eclipses of August 31, 1932 and February 14, 1934." *Pub. of the Astron. Society of the Pacific*, Vol. XLVI, No. 272, Aug. 1934.

Willi M. Cohn—"Polarisation and Spectrum of the Sky Light during the Total Solar Eclipses of August 31, 1932 and February 14, 1934." *Nature*, Vol. 134, p. 99, July 21, 1934.

Willi M. Cohn—"Some Observations of the Sky Polarisation during the Total Solar Eclipses of August 31, 1932 and February 14, 1934." *Physical Review*, Vol. 45, No. 11, June 1, 1934.

J. R. Roebuck, H. Osterberg—"The Joule-Thomson Effect in Helium." *Physical Review*, Vol. 43, No. 1, January 1, 1933.

J. R. Roebuck, H. Osterberg—"The Thermodynamic Properties of Helium Gas." *Physical Review*, Vol. 45, No. 5, March 1, 1934.

Reports of progress in research have been received from the following grantees: C. E. Tester Jr., D. C. Stockbarger, H. T. Stetson, N. H. Kent, F. E. Ross, J. Schilt, A. G. Worthing, C. Payne, A. C. Hardy, W. R. Fredrickson, C. E. Bennett, R. F. Frazier, Joel Stebbins, G. R. Harrison, and W. J. Luyten.

Respectfully submitted,

ARTHUR E. KENNELLY,  
*Chairman.*

May 8, 1935.

## REPORT OF THE C. M. WARREN COMMITTEE

The Committee had at its disposal at the beginning of the fiscal year 1934-1935, \$840.04, of which \$753.70 has been expended during the past year, leaving a balance of \$86.34.

Since the last annual report grants have been made as follows:

May 19, 1934: To Professor I. M. Kolthoff, University of Minnesota, \$200, to continue his study of internal structural changes taking place in freshly formed crystalline precipitates.

May 19, 1934: To Dr. Gordon H. Scott, Washington University, \$200, to continue his work on the nature and distribution of inorganic salts in cells and tissues.

May 19, 1935: To Dr. Hermann Schmid, Technische Hochschule, Vienna, \$150, to continue his work on the photometric measurements of short-lived intermediate products.

May 19, 1935: To Dr. Charles E. Teeter, Jr., \$200, to purchase supplies to aid in carrying out an accurate measurement of the Joule-Thomson coefficient and heat capacity at constant pressure for methane.

Eight applications for grants totaling \$1790 are before the Committee for consideration.

Reports of Progress, during the current year, have been received from: C. F. H. Allen, Nelson K. Richtmyer, Hermann Schmid, Carl L. A. Schmidt, W. E. Bradt.

The papers listed below, which have been published since the last report of the Committee, describe the results of investigations aided by the Warren Fund. In each case there is an acknowledgment by the author of the assistance received.

Nelson K. Richtmyer and Raymond M. Hann—"Glucosidohydroferulic Acid." *J. Am. Chem. Soc.*, **57**, 227 (1935).

Nelson K. Richtmyer and Eleanor H. Yeakel—"The Structure of Populin." *J. Am. Chem. Soc.*, **56**, 2495 (1934).

C. F. H. Allen, J. B. Normington and C. V. Wilson—"Certain Reactions of Gamma Ketonic Acids." *Canadian Journal of Research*, **11**, 382-394 (1934).

C. F. H. Allen and J. A. Scarrow—"The Addition of Cyanoacetamide to  $\alpha$ -Methoxybenzalacetophenone." *Canadian Journal of Research*, **11**, 395-405 (1934).

Nelson K. Richtmyer—"The Cleavage of Glycosides by Catalytic Hydrogenation." *J. Am. Chem. Soc.*, **56**, 1633 (1934).

JAMES F. NORRIS, *Chairman*.

May 8, 1935.

#### REPORT OF THE COMMITTEE OF PUBLICATION

The most important event in the history of the Committee of Publication during the year 1934-35 is the inauguration of a new series of publications by the Academy—the *Monumenta Palaeographica Vetera*.

The first series of this publication consists of "Dated Greek Minuscule Manuscripts to the year 1200" by Mr. and Mrs. Lake. In the plates, which are accompanied by an explanatory text, representative pages of these ancient manuscripts are reproduced by the collotype process in the exact size of the originals. Two fasciculi of this series are displayed on the table, with the other publications of the year, for examination by the Academy. Two fasciculi to be issued during the year 1935 are now in type, and it is expected that six more (two published annually) will be required to complete the first series.

The Academy has received aid for the publication of this series by generous grants from the American Council of Learned Societies, and we are much indebted to Messrs. Christophers of London for their care in handling the foreign subscriptions without compensation. The edition is 300 copies, and the subscriptions received are—domestic 32 and foreign 48, making a total of 80.

Another monumental work issued by the Academy during the year is the *Memoir* by Dr. Cleveland and his associates. This is illustrated by sixty beautiful plates dealing with the life-history of a remarkable wood-feeding roach and its symbiotic protozoa. It appeared as Part 2 of Vol. 17 of the *Memoirs*, completing that volume. For aid in the publication of this work the Academy received a grant from the Permanent Science Fund.

Vol. 18 of the *Memoirs* will begin with a *Memoir*, to appear this month, which is an extensive treatment of certain mathematical functions by the late Oliver D. Kellogg and Miss Mildred M. Sullivan. This will be followed by Part 2 of Vol. 18, now about to go to press, consisting of a *Memoir* on Hecataeus by Mr. Heidel.

Of the *Proceedings* there have appeared since the last annual

meeting eight numbers of Vol. 69 and three of Vol. 70. Of these two were printed with aid from the Rumford Fund. The fourth number of Vol. 70, by Mr. Carpenter, will appear this month.

The Committee has held four meetings and has had numerous conferences by mail and telephone during the year. Ten manuscripts have been accepted for publication, and four were rejected. The Committee has voted to limit the edition of the Memoirs to 500 copies, and has started plans for a second series of the Monumenta Palaeographica Vetera, details of which are not yet ready for announcement.

For convenience in accounting, the receipts and expenditures on account of the Dated Greek Manuscripts are kept separately as the "Lake Publication Fund." The amounts received and expended by the Committee during the fiscal year that ended March 31st, are shown in the following statements:

*General Publication Fund 1934-35*

*Receipts*

Balance April 1, 1934 . . . . .		\$2,998.97
Appropriation 1934-35 . . . . .		3,017.77
Rumford Fund, unexpended balance . . . . .	\$ 249.89	
Rumford Fund, grant 1934-35. . . . .	150.00	399.89
Gifts: Permanent Science Fund . . . . .	\$ 500.00	
Anonymous . . . . .	100.00	
Bond Astron. Club . . . . .	25.00	625.00
Sale of Publications . . . . .		348.31
Other receipts . . . . .		80.52
		<u>\$7,470.46</u>

*Expenses*

Transferred to Lake Publication Fund . . . . .	\$1,000.00
Printing: Memoirs Vol. 17, No. 2 . . . . .	\$1,721.74
Proceedings, Gen'l Fund . . . . .	\$1,870.68
Proceedings, Rumford Fund. . . . .	399.89
	<u>2,270.57</u>
Total printing . . . . .	3,992.31

Binding Proc. Vol. 68 . . . . .	28.35
Other expenses, postage, trucking, etc., . . . . .	397.26
Balance April 1, 1935 . . . . .	2,052.54
	<hr/>
	\$7,470.46

*Lake Publication Fund 1934-35**Receipts*

General Publication Fund . . . . .	\$1,071.77
American Council of Learned Societies . . . . .	2,000.00
Subscriptions received, less discounts . . . . .	1,111.05
Due from London agent, Mar. 31, 1935 (approximate)	
£46/6/- at \$4.85 . . . . .	224.55
Deficit 1934-35 (approximate) . . . . .	115.93
	<hr/>
	\$4,523.30

*Expenses*

Prospectus . . . . .	\$	361.33
Plates, Fasc. I . . . . .	\$1,424.37	
Plates, Fasc. II . . . . .	1,365.99	2,790.36
	<hr/>	
Text and binding Fasc. I . . . . .	\$	582.21
Text and binding Fasc. II . . . . .	600.44	1,182.65
	<hr/>	
Other expenses paid . . . . .		166.95
Due London agent for expenses to Mar. 31, 1935 (approximate) £4/10/10 at \$4.85 . . . . .		22.01
		<hr/>
		\$4,523.30

For the year 1935-36 the Lake Publication Fund has been credited with \$500 transferred from the General Publication Fund, and it has received a grant of \$2,000 from the American Council of Learned Societies.

ROBERT PAYNE BIGELOW, *Chairman.*

May 8, 1935.

## REPORT OF THE HOUSE COMMITTEE

The House Committee has had funds at its disposal amounting to \$3,149.90, made up as follows:

Balance from previous year . . . . .	\$ 721.90
Appropriations for 1934-35 . . . . .	2,200.00
Received for use of rooms . . . . .	228.00
Total . . . . .	\$3,149.90

Of this amount the sum of \$2,212.94 has been spent for the routine expenses, janitor, light, power, heat, telephone, etc., and \$369.21 has been spent for upkeep and equipment, making a total of \$2,582.15, and leaving an unexpended balance of \$567.75.

The two largest items in the expenditure for upkeep were \$110 for painting the outside walls of the stack building and \$103.62 for repairs on its roof and drain pipe.

In February of this year the acoustics of the Lecture Hall were greatly improved by covering the ceiling with sound absorbent material. The cost of this does not appear in the accompanying figures, since it was met from the Contingent Fund.

Meetings have been held as follows:

American Council of Learned Societies . . . . .	1
The Academy . . . . .	8
American Antiquarian Society . . . . .	1
American Chemical Society, Northeastern Section . . . . .	6
Archaeological Institute of America, Boston Society . . . . .	2
Geological Society of Boston . . . . .	4
Japan Society of Boston . . . . .	1
Mediaeval Academy of America . . . . .	1
New England Botanical Club . . . . .	9
Total . . . . .	33

The Council Chamber has been used for the Academy Council and Committee meetings, and also by the Trustees of the Children's Museum, the New England Farm and Garden Association, etc.

A detailed list of expenditures follows:

Janitor . . . . .	\$ 970.00
Electricity: Light . . . . .	231.07
Power . . . . .	66.74
Fuel . . . . .	612.93
Elevator . . . . .	90.65
Gas . . . . .	59.20
Telephone . . . . .	109.80
Water . . . . .	46.00
Ash tickets . . . . .	11.88
Upkeep . . . . .	321.63
Furnishing and equipment . . . . .	47.58
Janitor's supplies and sundries . . . . .	14.67
Total . . . . .	\$2,582.15

Respectfully submitted,

S. BURT WOLBACH, *Chairman.*

May 8, 1935.

On the recommendation of the Treasurer, it was *Voted*, That the annual assessment for the ensuing year be ten dollars.

The annual election resulted in the choice of the following officers and committees:

ROSCOE POUND, *President*

JAMES FLACK NORRIS, *Vice-President for Class I*

WALTER BRADFORD CANNON, *Vice-President for Class II*

EDWIN FRANCIS GAY, *Vice-President for Class III*

ARTHUR STANLEY PEASE, *Vice-President for Class IV*

TENNEY LOMBARD DAVIS, *Corresponding Secretary*

WALTER EUGENE CLARK, *Recording Secretary*

INGERSOLL BOWDITCH, *Treasurer*

ALFRED CHURCH LANE, *Librarian*

JOSHUA WHATMOUGH, *Editor*

*Councillors for Four Years*

DUGALD C. JACKSON, of Class I    ARTHUR N. HOLCOMBE, of Class III

RALPH H. WETMORE, of Class II    KENNETH J. CONANT, of Class IV

*Finance Committee*

THOMAS BARBOUR

PAUL J. SACHS

ALFRED L. RIPLEY

*Rumford Committee*ARTHUR E. KENNELLY, *Chairman*

ELIHU THOMSON	HARRY M. GOODWIN	HARLOW SHAPLEY
PERCY W. BRIDGMAN	CHARLES L. NORTON	NORTON A. KENT

*C. M. Warren Committee*JAMES F. NORRIS, *Chairman*

GREGORY P. BAXTER	ARTHUR D. LITTLE	REID HUNT
WALTER L. JENNINGS	FREDERICK G. KEYES	CHARLES A. KRAUS

*Committee of Publication*JOSHUA WHATMOUGH, *Chairman*

EDWIN C. KEMBLE, of Class I	JOSEPH H. BEALE, of Class III
FREDERIC T. LEWIS, of Class II	ROBERT P. BLAKE, of Class IV

*Committee on the Library*ALFRED C. LANE, *Chairman*

RAYMOND C. ARCHIBALD, of Class I	NATHAN ISAACS, of Class III
THOMAS BARBOUR, of Class II	HENRY B. WASHBURN, of Class IV

*Auditing Committee*

GEORGE R. AGASSIZ	ALEXANDER FORBES
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*House Committee*S. BURT WOLBACH, *Chairman*

WILLIAM H. LAWRENCE	ROBERT P. BIGELOW	DAVIS R. DEWEY
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*Committee on Biographical Notices*DAVIS R. DEWEY, *Chairman*

JAMES F. NORRIS	JOSEPH H. BEALE
ALFRED C. LANE	SAMUEL E. MORISON

*Committee on Meetings*

THE PRESIDENT

THE RECORDING SECRETARY

HARLOW SHAPLEY	LEIGH HOADLEY	ABBOTT P. USHER
JOSHUA WHATMOUGH		

The Corresponding Secretary announced that the following had been elected members of the Academy:

## FELLOWS

### CLASS I

- Section 1.* Gilbert Ames Bliss, Chicago, Ill.  
*Section 2.* Charles Elwood Mendenhall, Madison, Wis.  
Floyd Karker Richtmyer, Ithaca, N. Y.  
Robert Jemison Van de Graaff, Cambridge  
Bertram Eugene Warren, Cambridge  
*Section 3.* Louis Harris, Cambridge  
Nicholas Athanasius Milas, Belmont

### CLASS II

- Section 1.* Oliver Lanard Fassig, San Juan, Porto Rico  
Warren Judson Mead, Cambridge  
Derwent Stainthorpe Whittlesey, Cambridge  
*Section 2.* Bernard Ogilvie Dodge, New York, N. Y.  
*Section 3.* Charles Henry Blake, Cambridge  
John Franklin Daniel, Berkeley, Cal.  
Karl Friedrich Meyer, San Francisco, Cal.  
*Section 4.* Tracy Jackson Putnam, Brookline

### CLASS III

- Section 1.* James Brown Scott, Washington, D. C.  
*Section 2.* Tyler Dennett, Williamstown  
Charles Grove Haines, Los Angeles, Cal.  
*Section 4.* Jerome Davis Greene, Cambridge  
Henry Lee Shattuck, Boston

### CLASS IV

- Section 1.* Clark Leonard Hull, New Haven, Conn.  
Henry Alexander Murray, Jr., Boston  
Robert Sessions Woodworth, New York, N. Y.  
*Section 3.* Charles Henry Beeson, Chicago, Ill.  
Robert Johnson Bonner, Chicago, Ill.  
Tenney Frank, Baltimore, Md.

Benjamin Dean Meritt, Baltimore, Md.  
Henry Washington Prescott, Chicago, Ill.  
Henry Arthur Sanders, Ann Arbor, Mich.

*Section 4.* Walter Raymond Spalding, Cambridge

#### FOREIGN HONORARY MEMBERS

##### CLASS II

*Section 2.* Sir William Wright Smith, Edinburgh

##### CLASS III

*Section 3.* Luigi Einaudi, Turin, Italy  
John Maynard Keynes, Cambridge, England  
René Maunier, Paris, France  
S. Rudolph Steinmetz, Amsterdam, Holland

The following communication was presented:

Mr. Jerome D. Greene: "Japan's Position in Manchuria."

The meeting was dissolved at ten o'clock.



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## HENRY LARCOM ABBOT (1831-1927)

Fellow in Class I, Section 4, 1863

Henry Larcom Abbot, Fellow of the American Academy of Arts and Sciences, and of the National Academy of Sciences, Brigadier General, Corps of Engineers, U. S. Army, and an internationally famed engineer, was born at Beverly, Essex County, Massachusetts, August 13, 1831. He died at Cambridge, Massachusetts, Oct. 1, 1927, aged 96 years. He traced his descent through his father, Joseph Hale Abbot, a teacher of Cambridge, his grandparents Esra and Rebekah (Hale) Abbot of Wilton, New Hampshire, and through a line of ancestors devoted to the interests of community, church, and country, to George Abbot of Andover, Massachusetts, who settled there from England in 1642. Rebekah Hale, his grandmother, was niece of Captain Nathan Hale, "martyr-spy of the Revolution." On his mother's side, General Abbot was the grandson of Captain Henry Larcom of Beverly, who followed the sea throughout a long life. General Abbot's mother, Mrs. Fanny Ellingwood (Larcom) Abbot, was a granddaughter of Nathan Dane, LL.D., of the Continental Congress 1785-1788, framer of the famous Ordinance of 1787, and founder of the Dane Professorship of Law at Harvard University. General Abbot was the eldest of seven children.

Such was the ancestry of General Abbot. In his own countenance and character shone out the quiet scholarly life. Though not in the least lacking in social charm, he went little in society, preferring the study, where throughout his life he engaged in research, and in the preparation of papers, giving both to the technical and to the lay public the results of his investigations.

General Abbot entered West Point on July 1, 1850, and was graduated, number two in his class, June 1854. As Second Lieutenant, he was assigned to the corps of Topographical Engineers, U. S. Army, and ordered on May 1, 1855, to report for duty to Lieutenant R. S. Williamson for explorations and surveys in Northern California and Oregon for locating a railroad to connect the Sacramento Valley with the Columbia River. This survey involved much hardship and danger. During a considerable part of it young Abbot was in command of the party. Hostile Indians, almost impossible terrain, and shortage of supplies combined to make great difficulties. Neverthe-

less he completed his task successfully and recommended almost the exact route later adopted in building the first railroad northerly through that section. His report shows the same careful attention to scientific observations, though not immediately required by the actual problem in hand, which ever after characterized his engineering work.

General Abbot owed his election to the scientific academies of which he early became a member to the extensive investigations of the flow of the Mississippi River and its tributaries, and the most suitable measures for its flood control, which he made in cooperation with Captain (afterwards Major General) A. A. Humphreys, in the years 1857 to 1860. Their report is a classic in river hydraulics.

It is difficult to give an adequate idea of the comprehensive character of this extraordinary investigation. In it the authors aimed to accept no assumptions, but to satisfy every inquiry by exact measurements made under such a wide variety of conditions as to enable them to reduce the whole subject to accurate mathematical expression, so that estimates could be based with certainty thereon. The great task of the preparation and printing of the Mississippi River report was still occupying Lieutenant Abbot when the Civil War broke out in 1861. He managed to drive the book through the press in time to take part in the first battle of Bull Run, where he was seriously wounded, and brevetted captain for "gallant and meritorious services." Soon recovering from his wound, he was continuously in service and rapidly promoted so that at the age of thirty-three years he commanded a brigade of troops in the field.

During the Civil War, General Abbot took part in McClellan's Peninsular Campaign as Aide-de-Camp to General Barnard; was Chief Engineer to Banks' expedition to the Gulf; commanded regiment and brigade south of Washington, Feb. 1863-May 1864; commanded Siege Artilleries operating against Richmond, June 1864-Jan. 1865; was Chief of Artillery, Fort Fisher Expedition, Aug. 1, 1864; was promoted Bvt. Brigadier General U. S. Volunteers for gallant and meritorious services before Richmond, and Mar. 13, 1865, Bvt. Colonel, U. S. Army, and Bvt. Major General, U. S. Volunteers, "for gallant and meritorious services during the Rebellion."

General Abbot's war observations of the effects of mining operations both terrestrial and submarine, and his experience in the command of

siege artillery during the operations against Richmond, led him to conclusions which he embodied in an important paper, No. 14 of the Professional Papers of the Corps of Engineers.

Soon after the war, an Engineer School of Submarine Mining was established at Willets Point, New York, which General Abbot commanded for many years. During this period he published many papers giving the results of his investigations on explosives, submarine mining, the use of electricity and of fuses for firing explosives, and on related subjects. He had charge of the channel-deepening blasting at Hell Gate in 1885, and seized the opportunity to establish stations at various distances, and in different directions, so as to determine the velocity of transmission of earth tremors.

During the last seven years of his active service, General Abbot was president of the permanent Board of Engineers in New York to which were referred the more important questions which came under the attention of the Chief of Engineers. He was retired for age in 1895, being then ranking officer of the Corps of Engineers, but not receiving the appointment as Chief. He was for many years thereafter associated with the faculties of George Washington University and Dartmouth College.

Soon after his retirement from active duty, General Abbot was invited in 1897 to be Chief Engineer of "La Compagnie Nouvelle du Canal de Panama." He took the leading part in the investigations which it undertook to rescue the abortive project of the Old Panama Company begun under de Lesseps.

The plan perfected by an international committee of consulting engineers having been approved by the New Company, General Abbot had the honor of being the only foreign member included in the French Commission which was set up for putting the plan into execution. The proposal debated about 1899 in the Congress of the United States for constructing an interoceanic canal through Nicaragua forced the New Company to enter into negotiations with our Government for the sale of their equities in Panama. General Abbot's investigations had thoroughly convinced him of the greater practicability of the Panama route. His forceful testimony tended to move Congress and the Executive to prefer that route, although there was a strong prejudice in high quarters against dealing with the French Company. The Walker Commission, appointed by President McKin-

ley, at first reported favorably to the Nicaragua route, but when the French Company reduced its price to \$40,000,000, the Walker Commission changed its report to prefer Panama.

During the next several years a tangle of diplomatic and other interests held the question in the balance, with General Abbot publishing from time to time powerful articles in favor of a high-level lock canal at Panama. In the end he convinced Senator Mark Hanna, as well as Senator Spooner, and Secretary of War Taft; and finally, on June 21, 1906, General Abbot's preferred type of canal was authorized. Many additional details of this and other concerns of General Abbot's, during his effective engineering career of more than 50 years, will be found in the Biographical Memoir, Vol. XIII, First Memoir, 1929, of the National Academy of Sciences.

General Abbot married April 2, 1856, Mary Susan Everett of Cambridge, Massachusetts, who died March 13, 1871, aged 39 years. They had four children, two sons and two daughters.

General Abbot was very gentle and loving in his home life, though so deeply immersed in his unremitting researches and military duties as not very easily to be drawn into social intercourse; not a talkative man, he was a good listener, with face alight with kindly interest, when actually drawn out of his computations, and brought into the social circle. He received the reverence and warm affection due to an unblemished, kindly, generous character.

CHARLES G. ABBOT.

### MINÉITCIRO ADATCI (1870-1934)

Foreign Honorary Member in Class III, Section 2, 1932

Minéitciro Adatci was born in Yamagata, Japan, July 29, 1870, and died at The Hague, December 28, 1934. After graduating in law at the University of Tokyo in 1892, he soon entered the diplomatic service and served in the different lower grades abroad, with duty from time to time in the Ministry for Foreign Affairs in Tokyo. He acted as *Chargé d'affaires* at Rome and at Paris. Appointed Minister to Mexico in 1912 he served till 1915, and then for two years on missions to Russia. In 1916 he was made Minister to Belgium and in 1920 Ambassador to Belgium, but was transferred as Ambassador to France in the same year.

Mr. Adatci was elected a Judge of the Permanent Court of International Arbitration in 1924. He had previously found time to serve as judge of the Prize Courts at Sasebo and Yokosuka during the Russo-Japanese war, 1904-1905, and as a member of the committee which drafted the peace treaty at Portsmouth in 1905. He was a delegate to the Peace Conference at Paris, 1919; he aided in drafting the Statute of the Permanent Court of International Justice in 1920; he was a delegate of Japan to the League of Nations Assembly; and from 1927 to 1930 he represented Japan in the Council of the League of Nations, as well as from time to time in many other capacities.

Mr. Adatci was elected a member of the Permanent Court of International Justice in 1931 and immediately became President, serving in that capacity from January 16, 1931, to December 31, 1933, and he remained a member of the Court till his death.

Mr. Adatci was a member of many learned societies, among them the Japanese Academy, and the Institute of International Law; he was also an honorary member of the American Society of International Law.

Mr. Adatci's genial and cultured personality as well as his wide and sound learning gained many friends both for himself and for his country.

He revered the Permanent Court of International Justice, referring to it in his opening address in 1931 as "the living embodiment of the conception of peace based on law," and added "The conception endures, and the institution remains, but men change."

GEORGE G. WILSON.

### JOHN SPENCER BASSETT (1867-1928)

Fellow in Class III, Section 3, 1921

Few writers and editors in the field of American History have done so much to stimulate intensive study and publication in the field of learning which they have adorned as John Spencer Bassett. A North Carolinian by birth, a graduate of Trinity College, a Doctor of Johns Hopkins—both southern institutions—he was later connected as a teacher in the historical field with four northern universities and colleges: Yale, New York, Columbia, and Smith, in which last he was a professor at the time of his accidental and lamented death in 1928.

Not many American scholars have had such a breadth of training and of experience. He was by nature a good teacher, a good investigator, a good writer. As a good editor he directed and combined historical and literary work by other scholars.

Bassett's early experience made him throughout his life especially interested in southern antebellum social and economic organization. He was the author of several publications on the actual conditions of slavery and its effect on the life of master and slave, particularly on the North Carolina plantations. He also published volumes on the colonial beginnings of the southern colonies and wrote two biographies of southern-born Presidents—Andrew Jackson and Abraham Lincoln. He was a man who could take part in coöperative enterprises, and one of his best volumes is his *Federalist System*, a part of the *American Nation* series.

His interests were not tied up in the difficulties and solutions of the past. When the great crisis of the World War came on in 1914 he addressed himself to two volumes on the relation of the United States to the European struggle and the later League of Nations.

This enumeration of his contributions to the literature of American History, included in more than twenty separate volumes, was only a part of his service to his country. Through his classroom teaching, his contact with student minds, his editorial work, his executive capacity as secretary of the American Historical Association, and his contact with writers and journalists and eager young men and young women who came under his influence, he became a recognized force in the writing and teaching of American History.

Few American scholars have shown such breadth of training and of experience. He was by nature a good teacher, a good investigator, a good writer, a good leader, and a good friend. He could work in harness with other people, and he could lay out historical and literary work for other scholars to perfect. Loyal to the South throughout his life, he was equally loyal to the North and to the West. Bassett was an all-round man, to whom the fraternity of historical, political, and economic scholars owes a debt which can only be repaid by applying his principles of research and judgment and personal influence. He was *integer vitae*.

ALBERT BUSHNELL HART.

## GEORGE HOYT BIGELOW (1890-1934)

Fellow in Class III, Section 4, 1933

George Bigelow was son of a fine old type of general practitioner, Dr. Enos H. Bigelow of Framingham. His father was always interested in public affairs. He served a few terms in the state legislature and he was interested in preventive medicine and public health. Probably the son George got his impetus towards public health from his father. He graduated from Harvard College as of 1913. He took his senior year in the Medical School, getting his M.D. in 1916. He served as interne in medicine at the Massachusetts General Hospital, did some war service, and he got his degree of Doctor of Public Health also from Harvard in 1921. His personal experience in medicine and public health was extensive. He studied the patient in the wards of the hospital. He studied various diseases in the laboratories. He studied yaws, for example, in the tropics. In 1921 he went out to Antioch College in Yellow Springs, Ohio, to be head of the Department of Industrial Medicine and Hygiene. Following that, he came to New York to be the director of the Cornell Clinic in New York City. In 1924, he was persuaded to come back to Massachusetts to be the director of the Division of Communicable Diseases in the State Department of Public Health. With the death of the Commissioner, he was appointed Commissioner of Public Health in Massachusetts in 1925, which position he occupied until 1933. In 1934, he undertook the directorship of the Massachusetts General Hospital and Massachusetts Eye and Ear Infirmary. He served in this capacity rather less than a year when he died suddenly by his own decision. Dr. Bigelow had made in a relatively few years a tremendous impression upon the public health of this country. He was unusual in the first instance because he was trained for his work. He came to his work with the best training of the time and brought with it a vigor and a mental capacity which at the present time, at least, is without parallel. He had additional attributes which made him outstanding, his complete mental honesty and fearlessness. Of great value to himself and to the public was his sense of humor. Public health is too often a dull, dreary, uninteresting area inhabited by arid facts and harrassed, conscientious public servants of mediocre intelligence. Bigelow's writings and sayings put a dazzling search-

light upon the area of public health and his lively imagination peopled this area with living, interesting, delightful things. Moreover, his love of a well turned phrase or a humorous twist was always used to cap his points and not to divert them. In his scientific publications, of which there were many despite the arduous duties of a state executive, was shown only the vigor and intellectual honesty of the man. He developed a great Department of Public Health in Massachusetts, one that would rank with the old Massachusetts State Boards of Health with Lemuel Shattuck, Bowditch, and Walcott.

Just why Dr. Bigelow left the field of public health is not entirely clear. It is likely that he became conscious of the terrific strain that it involved and of course he must have had the satisfaction of having accomplished a real major task. When, after much hesitation, he decided to go into hospital administration work, that decision was hailed with the greatest enthusiasm by all those who were interested in hospitals, in the hospital problems, medical service, medical practice, and medical education. The hospital situation in general in this country needed just the qualities that Dr. Bigelow had in such abundance, but he was able only to make a start.

ROGER I. LEE.

### JOHN CASPAR BRANNER (1850-1922)

Fellow in Class II, Section 1, 1921

Branner was born in New Market, Tennessee, July 4, 1850, and died March 1, 1922. He was of a leading Virginia family and one of the distinguished geologists of his day. His memoir by R. A. F. Penrose, Jr.<sup>1</sup> for the Geological Society of America, of which he was president in 1904, gives an excellent account of his work, and *Who's Who* (Vol XI, 1921-1922) lists his degrees (from the B.S. Cornell 1874, to the honorary Sc.D. Chicago 1916) and society memberships.

We may select the following facts as significant:

He was an authority on Brazil, where he worked from 1875 to 1883, and whither he frequently returned. Three out of five publications of the last year of his life pertained to Brazil.

From 1887 to 1893 he was director of the Arkansas Geological Survey. In this position he had the unusual distinction of being

<sup>1</sup> *Bull. Geol. Soc. of America*, 36, pp. 15-23, bibliography pp. 23-44.

hanged in effigy for his discouragement of fraudulent alleged mines. He gathered about him there a group of men of marked distinction, whose reports, like that of R. A. Penrose on manganese (1891), and that of J. F. Williams on the igneous rocks, had much more than local value. He himself did much work on the bauxites, besides the detail work of a state geologist. From then on his bibliography of four hundred titles shows several papers a year, mostly on Brazilian and Arkansas geology, some of them in botany.

After moving to California he became interested in seismology, when that subject was not popular among Californians, and with his money and energy really kept the Seismological Society alive through a difficult period.

Primarily a geologist, he also contributed studies in the fields of botany and entomology, and was a linguist of ability, not only in Latin and Greek, but also in Portuguese, the language in which he wrote a textbook for Brazilians, of which he wrote a grammar for English speaking people, and from which he translated a history of the Inquisition in Portugal.

From 1892 on he was connected with Leland Stanford University as professor of geology, acting president, president, and president emeritus. In reference to certain honors received he said that the greatest "was that of having those who had been his students doing good and honest work in every quarter of the globe." Thus a tribute after his own heart was that of Mr. and Mrs. Herbert Hoover, who met in his laboratory. In presenting a translation of *De Re Metallica* of George Agricola they dedicated it as follows: "To John Caspar Branner, Ph.D., the inspiration of whose teaching is no less great than his contributions to science."

A. C. LANE.

#### CHARLES HENRY BRENT (1862-1929)

Fellow in Class III, Section 1, 1919

Charles Henry Brent was one of the outstanding Christian leaders of his generation. Born in New Castle, Ontario, April 9, 1862, the son of the Rev. Canon Henry and Frances Sophia (Cummings) Brent, he graduated from Trinity College, University of Toronto, in 1884. Ordained in 1886, he spent brief periods of service as an Assistant at St. Paul's Church, Buffalo, and St. John the Evangelist's,

Boston. From 1891 to 1901 he was the Associate Rector of St. Stephen's Church, Boston, making during these years a deep spiritual impress upon the life of the city.

It was no surprise that in 1901 he was, as a result, elected to a position of great responsibility and of high adventure, the first Missionary Bishop of the Protestant Episcopal Church in the newly acquired Philippine Islands. It is not possible to summarize briefly the many years of his episcopate in the Philippines. Suffice it to state that he showed the highest type of Christian statesmanship in his pioneering field, winning the respect and affection of all, natives and foreigners alike.

At the same time, in his many trips to the United States, he became increasingly known as a man of spiritual power. He twice declined election to the Bishopric of Washington, D. C., and in 1914 he declined to become Bishop of New Jersey. In 1907, he was the William Belden Noble Lecturer at Harvard University. Long interested in the conquest of opium, he served as a member of the Philippine Opium Commission, 1903-1904, Chief Commissioner for the United States, and President of the International Opium Commission, 1908-1909, as well as of a similar conference at the Hague in 1911.

In 1918 he accepted election as Bishop of Central New York, and in the same year became Senior Chaplain of the American Expeditionary Force in France, for the duration of the War. He was awarded the D.S.M. by his own nation, and was made a Commander of the Order of Leopold, a Companion of the Bath, and an officer of the Legion of Honor.

After the War, he assumed his duties in Buffalo as Bishop of Western New York, in addition giving the Duff lectures in Scotland, and becoming a member of the Board of Overseers of Harvard University in 1921. But his great passion in the remaining years was for the cause of Christian unity. Though not well, he labored unceasingly for a united church, being President of the World Conference on Faith and Order.

Bishop Brent was the author of numerous volumes of sermons and essays. He was given honorary degrees by many universities and colleges, including Trinity College, King's College, Harvard, Columbia, Yale, Hobart, Glasgow, Union, Toronto, and the University of New York. He died at Lausanne, Switzerland, March 27, 1929.

Here is the record of important events in his life; but such a record cannot reveal him as he was. Only those who knew him will recall that indefinable quality in him which made eternal life a present and vivid reality.

HENRY KNOX SHERRILL.

### JOHN ISAAC BRIQUET (1870-1931)

Foreign Honorary Member in Class II, Section 2, 1914

John Briquet was born at Geneva, Switzerland, March 13, 1870. He studied at universities in his native city, in Scotland and in Germany—an international education which gave him, among other things, an unusual facility in languages. On his return to Geneva in 1890 he was appointed a curator in the Conservatoire et Jardin Botanique and succeeded in 1896 to the directorship, a post which he held until his death, October 26, 1931.

Although a distinguished man of science and the recipient of many honors, Briquet was perhaps most generally known among his colleagues for that part of his work which was, from the strict standpoint of research, least important. When, in 1900, botanists became convinced that a serious effort to unify practice in nomenclature was necessary, the international congress of that year put him at the head of a committee to prepare a new set of rules for the purpose. With this matter he was concerned for the rest of his life. He brought to it a singular clarity and keenness of mind, excellent judgement, a friendly spirit and a polished literary style which could make the driest discussion (and the subject was rather arid) almost agreeable. Nomenclature is as necessary for mutual understanding in botany as grammar is in language; Briquet perceived the analogy and built his rules on such definite tendencies as could be discerned in the then rather chaotic state of usage. His code passed the congress of 1905 by a substantial majority; but a considerable group of Americans and individual theorists elsewhere refused to accept it. Some small additions were made to it in 1910. After an interval of twenty years, caused by the war, it was again taken up in 1930. This time it was, at the instance of British botanists led by Dr. T. M. Sprague and in the light of accumulated experience, extensively revised in detail; but the guiding hand was still Briquet's. And this time everyone

accepted it. Whatever the matter, it was no mean achievement to have stood through thirty years steadily for reason and common sense and in the end to have brought the botanical world to his side.

Briquet was among the foremost botanical systematists and administrators of museums in Europe. As director of the Conservatory, he brought it up from a poorly lodged and disorganized, though already very valuable, collection to be one of the greatest establishments of its kind, pleasantly situated and well housed. As an investigator, he worked with distinction along many botanical lines. First of all a taxonomist, he endeavored always to broaden the base of his classification and to bring to its service whatever other branches of the science might have to contribute. His floras of the Maritime Alps and of Corsica (both, unhappily, still incomplete at his death), the fruit of many summers in the field, are philosophic studies of the plants of natural areas in their relations to taxonomy, phytogeography and geological history. His studies of the structure of the fruit in the families *Umbelliferae* and *Compositae* were of high importance in their field and contributed much to the understanding of previously obscure relationships.

C. A. WEATHERBY.

#### NATHANIEL LORD BRITTON (1859-1934)

Fellow in Class II, Section 2, 1925

Nathaniel Lord Britton was born at New Dorp, Staten Island, New York, January 15, 1859, and died in New York, June 25, 1934. As a young man, divided in his interest between botany and geology, he graduated from the School of Mines at Columbia, in 1879. There, under the influence of John Strong Newberry, he was encouraged to continue his botanical work. Upon graduation Britton became Assistant in Geology under Newberry; and for five years he was Botanist and Assistant Geologist of the Geological Survey of New Jersey; these years seeing the completion of his first extended botanical publication. In 1886 he became Instructor in Geology and Botany at Columbia, later advancing to Professor of Botany.

Convinced that the nomenclature of plants should be treated as a mechanical system, rather than as a language built up through selective good usage, Britton early took the lead of a so-called "radical" move-

ment among some American botanists. To the changes of practice which seemed to him and his followers of paramount importance he devoted limitless energy and was everywhere recognized as the leader of his cause. The principles for which he stood were incorporated into his many volumes on the floras of eastern North America, Bermuda, the Bahamas and the West Indies and in his extensive monographic studies; and, although the majority of botanists of the world declined to accept his more radical departures from usage, he held tenaciously to his individual principles throughout more than forty productive years.

In the late 80's Dr. Britton and some of his associates formed a committee to consider the possible establishment of a botanic garden in the city of New York. Vigorously pushing this project the committee soon achieved success, and The New York Botanical Garden, with Britton as its Director-in-Chief, became an accomplished fact. The remarkable executive capacity of the Director, and his purpose to make the Garden indispensable to the community and a great center for botanical research, are abundantly attested by its growth to an area of 400 acres, by rich scientific output, and by the diversified staff of investigators and teachers who surrounded him at the end of his thirty-nine years as Director.

Soon after getting the New York Botanical Garden in successful operation Dr. Britton turned his attention to the West Indies. He made thirty visits for botanical exploration to various islands, in which he was accompanied by Mrs. Britton, herself a distinguished botanist, or by members of his staff. Future generations will remember him chiefly for his untiring and eminently successful efforts to establish a great Botanic Garden in the city of New York and for his intensive studies of the flora of the West Indies.

M. L. FERNALD.

### THOMAS CHROWDER CHAMBERLIN (1843-1928)

Fellow in Class II, Section 1, 1901

During the Christmas recess at the close of 1914, the Department of Geology at the University of Chicago expanded from the overcrowded Walker Museum into the just-completed Rosenwald Hall. On Christmas morning I spent a few hours in the small room beneath

the eaves, which had been assigned to me as a graduate student, arranging books and fossils so that everything would be ship-shape for the continuation of my research after the chaos of moving-day. I thought I was alone in the building but suddenly a step sounded in the corridor and there at the open door of my room stood the genial figure of Professor Thomas Chrowder Chamberlin with a radiant smile on his benign countenance and a "Merry Christmas" on his lips. I was so astonished that I am afraid I failed utterly to make the orthodox reply and only gave voice to my surprise that he of all the members of the department should be in the building that day. His characteristically frank response was to the effect that "no day, not even Christmas, would be a happy one unless I wrote a few pages of manuscript or jotted down some notes concerning my research."

That little incident is indelibly impressed upon my mind. It reveals with complete accuracy the spirit of the man and affords a flash of insight concerning the secret of his success. Indefatigable industry, unbounded love for the quest of knowledge, unending passion for intellectual adventure, and fond interest in the activities of the younger men associated with him either as students or colleagues—all these and more were displayed.

T. C. Chamberlin was born September 25, 1843, a few miles southwest of the site of the present city of Mattoon, Illinois, "on the crest of the Shelbyville terminal moraine." When he was about three years old, his "circuit-rider" father, by preference a Methodist minister and by necessity a farmer as well, moved the family to the vicinity of Beloit, Wisconsin. Here he "grew up in an atmosphere of serious and sharp debate in theology and philosophy." After his graduation from Beloit College in 1866, the next few years were spent in teaching in High School and Normal School, with a year of graduate study at the University of Michigan.

In 1873 the Geological Survey of Wisconsin was organized and Chamberlin was appointed assistant geologist. From 1876 to the completion of the Survey in 1882, he was chief geologist. The four volumes of the Survey's report, "Geology of Wisconsin," are models of pioneer geologic research, in which the chief geologist's contributions deal especially with the glacial deposits, the lead and zinc ores, and the Silurian coral reefs.

The study of the glacial features of Wisconsin led to the appoint-

ment of Chamberlin as geologist in charge of the glacial division of the United States Geological Survey in 1881, a post which he continued to occupy with great distinction and unqualified success until 1904. The series of notable memoirs by Chamberlin and his associates which appeared in rapid succession in the Annual Reports of the Director of the United States Geological Survey between 1882 and 1888 are among the classics of geological literature. Even after other duties began to consume his time, Chamberlin continued to direct the work of the glacial division which proved under his stimulating leadership to be a training field for faithful and painstaking observations and constructive interpretations in which more than a score of geologists, now well known and highly honored, were given a start in the right direction.

Chamberlin became President of the University of Wisconsin in 1887 and in the next five years transformed that institution from a college into a true university, both in organization and in spirit. Nevertheless, when in 1891 he was offered the headship of the department of geology to be organized in the new University of Chicago, he accepted "with a deep feeling of relief at being free from the burdens of the University presidency." From 1892 to 1918, Chamberlin devoted his energy unstintingly to the great institution of learning which developed with astounding rapidity in Chicago. In many ways he contributed to the revolutionary expansion of the University along scientific lines. Here he established the *Journal of Geology*, and here under his oversight there developed one of the greatest geological departments in any university, American or foreign, during the first two decades of the twentieth century.

At the close of the academic year in 1918, shortly before his seventy-fifth birthday, Professor Chamberlin retired from his University duties, continuing only his service as senior editor of the *Journal of Geology*. But retirement meant to him merely greater freedom for continuing his research, and the last ten years of his life were among the most fruitful. One of the finest of all his publications was *The Two Solar Families* which came from the press on his eighty-fifth birthday, a few weeks before his death, November 15, 1928.

The two hundred fifty one titles in the bibliography of Chamberlin's published works, which accompanies the biography by his son, Rollin T. Chamberlin, Biographical Memoirs, National Academy of

Sciences, vol. 15, pp. 309-407, 1934, indicate something of his breadth of interest and the scope of his mind. Among his numerous contributions to geological science, probably the most significant are those which deal with multiple glaciation of North America, geological climates, the age of the earth and sun, the origin of the earth, the origin of life, the evolution of the earlier vertebrates, the methods of geologic correlation, diastrophism, and the earth's interior. His name is indissolubly linked with the planetesimal theory of earth origin and the doctrine of multiple working hypotheses as the method for scientific attack upon a problem.

KIRTLEY F. MATHER.

### HERDMAN FITZGERALD CLELAND (1869-1935)

Fellow in Class II, Section 1, 1911

Herdman Fitzgerald Cleland, Edward Brust professor of geology and mineralogy at Williams College, was born at Milan, Illinois, July 13, 1869, the son of David J. and Margaret (Betty) Cleland. He met a tragic death in the *Mohawk* disaster on January 24, 1935, while en route to Yucatan with a party of young men whom he was to guide in the study of the Mayan remains. Three of the students, all seniors at Williams, shared his fate.

Cleland was of Scottish and Irish ancestry. He inherited a tradition of culture, refinement and scholarship. His thrifty Scottish training was a lifelong advantage. He lived simply but well, always managing to set aside something to be used in helping others. President Tyler Dennett has said of him: "He was also generous, one of the most generous citizens of Williamstown, not in ostentatious ways, but quietly and simply as he lived. I am told that there is more than one family in our village, which, due to his help, now owns the roof over their heads. There are others, many of them, who learned that when in sore need they could find both sympathy and substantial help. A model teacher, he was in equal degree a model citizen."

Although quiet and reserved, Cleland had an infinite capacity for making friends, to whom his conversation was a delight. He was fastidious, physically and mentally, and was annoyed by much which he saw and read; but his criticisms generally emerged as witty remarks which did not sting; yet were so pointed that they often produced good

results. He was forthright and frank, yet withal so just that he aroused no personal antagonism. The mass production of the lecture system did not appeal to him. He was profoundly interested in each of his students, ever ready with counsel, advice, and stimulus. That his students were well trained is attested by the records of the geologists who have graduated from Williams during the last thirty-three years. His instruction and his personality equally influenced a majority of his students who did not become professional geologists.

Cleland's early education was greatly delayed by the inadequacy of the schools in the small frontier town in which he passed his earlier years. He received a part of his preparatory training, and took two years of undergraduate work, at Gates College in Nebraska, but received his A.B. at Oberlin in 1894, where his interest in geology was fostered by the late Professor Alfred A. Wright. After graduation, ill health forced him to return for a year to the home of his father at Pierce, Nebraska. He attended the summer session of the University of Nebraska in 1895, and that fall entered upon the duties of professor of natural sciences at Gates College, where he remained three years. A summer at the University of Chicago in 1896 crystallized his leanings toward geology, and, realizing the difficulty of teaching all the natural sciences, he gave up his position at Gates College in 1898. That autumn he entered the graduate school at Yale, studying chiefly under Henry Shaler Williams, then the outstanding exponent of stratigraphic paleontology. He received his degree of doctor of philosophy there in June, 1900.

Cleland spent the ensuing year at Cornell, engaged in research and teaching. During Professor Harris's absence in the winter term, which he then devoted to his duties as state geologist of Louisiana, Cleland gave the courses, one of which was devoted to a detailed discussion of the fossil Brachiopoda.

In the autumn of 1901, he was called to Williams College, where he was instructor in geology and botany till 1904, assistant professor till 1907, when he became professor of geology and mineralogy. After teaching all the sciences, he was at last in a position to teach one. Even so his task was not simple. He had to build up a department and a museum. He succeeded in doing both.

Cleland's early researches were in the realms of paleontology and stratigraphy. His doctoral dissertation, published as a Bulletin of

the U. S. Geological Survey, was a very detailed study of the distribution of the fossils in the Hamilton formations exposed along Cayuga Lake. He later described the fauna of the Mid-Devonian Strata at Milwaukee, Wisconsin, and also published two important papers descriptive of the Beekmantown fossils of the Mohawk Valley. He subsequently withdrew almost entirely from this field, devoting himself to his first textbook, "Physical and Historical Geology" (American Book Company, New York, 1916), and to other geological subjects, particularly the origin of natural bridges. His "Practical Applications of Geology and Physiography" (Excelsior Press, North Adams) appeared in 1920.

Later in his life his interests changed again. Numerous trips to Europe, some of them prolonged, brought him in contact with the vestiges of prehistoric civilizations. He took up particularly the study of the Neolithic and later ages, a part of the story of ancient man commonly considered to be outside the province of the geologist. This led to his interesting book, "Our Prehistoric Ancestors" (Coward-McCann, Inc., New York, 1928). His last work was a little volume entitled, "Why be an Evolutionist?" 1930.

Cleland was a fellow of the American Association for the Advancement of Science, the American Academy of Arts and Sciences, the Geological Society of America (councilor, 1928-1931), the Paleontological Society (secretary, 1909), the American Geographical Society, a member of the Seismological Society, the American Institute of Mining and Metallurgical Engineers, the American Archeological Society, the New York Academy of Science, of Phi Gamma Delta, of Sigma Xi, and of Phi Beta Kappa (honorary member).

He was married twice, first to Helen Williams Davison, and, after her death, to Emily Leonard Wadsworth. His widow, four daughters, a brother and a twin sister, Elizabeth, who has ever been his help in time of trouble, survive him.

The above sketch is an abridgment of one published by the writer in *Science*, Apr. 5, 1935. A longer notice, with complete bibliography and portrait, will appear in the *Proceedings of the Geological Society of America* in 1936.

PERCY E. RAYMONT

## GEORGE CARY COMSTOCK (1855-1934)

Fellow in Class I, Section 1, 1913

Dr. George C. Comstock, professor emeritus of astronomy and director emeritus of the Washburn Observatory of the University of Wisconsin, died in Madison on May 11, 1934, in his eightieth year. In his passing we lose one of the last connections with American astronomy of fifty years ago, an investigator who was himself a leader in the science throughout his long career. He was distinguished as a teacher, an observer, a theorizer, an author, an organizer, and an administrator.

Comstock traced his ancestry on his father's side directly to the Mayflower. His grandfather moved from New England to Ohio in 1810, and his father was a resident of Madison, Wisconsin, when the future astronomer was born on February 12, 1855. The family moved to Michigan where Comstock spent his youth and prepared for college. Entering the University at Ann Arbor he took a scientific course and was graduated in 1877. While an undergraduate he came under the tutelage of Professor James Craig Watson, who was to influence his whole later life.

It was in 1854 that the German astronomer Francis Brünnow was called to Michigan. Trained in the traditions of his home institutions, Brünnow carried to a midwestern college the methods of a German university, and lectured in broken English to diminishing classes until Watson was his only student. Yet there was developed by Watson, who ultimately succeeded Brünnow, and the others at Michigan, the leading school for the study of astronomy in the country at that time. One of the foremost of the students was Comstock.

After several years as a civil engineer it was in 1881 that Comstock followed Watson to Wisconsin to be assistant in the Washburn Observatory. Then, after Watson's premature death, Comstock served at Madison under Edward S. Holden, later the first director of the Lick Observatory. As a career in astronomy involved considerable uncertainty, Comstock devoted his spare time to the study of law; he was graduated from the Wisconsin law school in 1883, but he never practised. Nevertheless, he later often referred to his legal training as possibly the most valuable part of his education.

At the age of thirty he was definitely committed to an academic career by an opening at Ohio State University, where he served as

professor of mathematics for two years. In 1887, when Holden left to take up active service at the Lick Observatory, it was President T. C. Chamberlin who called Comstock to take charge of the Washburn Observatory. Watson and Holden had already given it a place of distinction in their science quite beyond that which would ordinarily be reached by a small observatory, and during the following thirty-five years Comstock maintained the quality of its work, both as its principal observer and as its administrator.

Throughout his scientific activity Comstock held an unusually happy balance between theory and practice. Though the observational astronomy of his early days consisted essentially of the visual measurement of angles he never became a routine observer. As a substitute for the meridian circle he adopted Loewy's method of placing a prism in front of a telescope, and by observing simultaneously stars separated by arcs of  $120^\circ$  the measures could be carried round the sphere in three steps, with the advantage that the quantities actually measured were small angles rather than large ones. From this work there resulted one of the best determinations of the constant of aberration ever made.

Comstock developed a simple formula for the amount of the atmospheric refraction which replaces in many cases the complicated procedure necessary for its evaluation. His measures of double stars were continued more than thirty years; the quality of his observations was always of the highest, exemplifying the statement that "the precision of a double-star measure bears no direct relation to the size of the telescope with which it is made." He contributed new methods of determining binary orbits, but the chief outcome of the double-star work was the detection of proper motions of faint stars.

One high authority on double stars had stated that there was yet to be brought forth any evidence of the proper motion of a really faint star, but Comstock demonstrated that stars as faint as the twelfth magnitude do move enough to be detected. By the remeasurement of faint companions of bright double stars, observed incidentally by the Struves and others early in the nineteenth century, he found that, when the known motions of the bright stars were allowed for, the remaining discrepancies were due to the motions of the faint ones. This conclusion was confirmed by a determination of the sun's way from the motions of the faint stars alone. From the average apparent

motion of these stars, some five or six times fainter than had been previously studied, it was evident that they were nearer to us than would be inferred from their apparent brightness. Comstock gave two alternatives—either there is an appreciable absorption of light in space or the stars which he studied are intrinsically fainter than the bright ones. The second alternative has turned out to be the correct one, and the great preponderance of stars of low intrinsic luminosity in a given volume of space, which his work foreshadowed, has been amply confirmed in recent years.

Although Comstock held what was essentially a research position, he was an inspiring teacher of the few who came to study with him, due in large part to his mastery of clear and apt expression. In private conversation, in the classroom or at larger gatherings there was never any doubt of the meaning of his words, and the ease and finish of his speech was a source of constant admiration to his listeners.

One of the important measures of the first year of the administration of President Van Hise at the University of Wisconsin in 1904 was the definite organization of the graduate school. He selected Comstock to be the head of the school, and placed on him the task of working out the problems of a new division of the university, one that was growing rapidly both in size and in importance. He held this position until 1920, as chairman, director, and dean; showing in it his qualities of quiet efficiency and breadth of view. He received a school without definite organization and with about 150 students; he left it fully organized for teaching and for research and with its number nearly quadrupled. The duties of directing the graduate school naturally interfered with his scientific work during the later years, but on relinquishing the deanship he continued active, and finished and published the researches on which he had been long engaged.

Comstock received, as was his due, many honors from his fellows. He was a member of the National Academy of Sciences and of numerous other societies in this country and abroad. He was elected to the American Academy of Arts and Sciences in 1913. He was active in the organization of the American Astronomical Society and served for ten years as its first secretary; he was later recalled from retirement to be its president.

He retired from university service in 1922 and had the happiness of twelve years of active and interested leisure; and the satisfaction

of seeing the continued progress of the university and the departments with which he had been connected.

JOEL STEBBINS.

See also article in *Popular Astronomy*, 43, 1935, pp. 1-7.

ROBERT SEYMOUR CONWAY (1864-1933)

Foreign Honorary Member in Class IV, Section 3, 1931

Robert Seymour Conway, a Foreign Honorary Member of the Academy, was born at Walthamstow in 1864. He was educated at the City of London School, actually beginning his study of Sanskrit while still there; and (after a year at University College, London) at Gonville and Caius College, Cambridge, of which he was successively scholar, Fellow, and (after 1920) honorary Fellow. As an undergraduate he held the Waddington University Scholarship, took a first in both parts of the Classical tripos, and gained distinction in Part II of the tripos in Section E (Comparative Philology). In those days Comparative Philology was flourishing in Cambridge, and Conway, had he maintained his early devotion to it and been kept in Cambridge, could not have failed to make and keep it vital there. As it was he became Professor of Latin first in University College, Cardiff, and then (1903-1929) in the University of Manchester. His life work, therefore, was the teaching of Latin and the interpretation of Latin. As part of his work for the Cambridge tripos he had produced a dissertation on problems connected with intervocalic rhotacism in Italic, and before he left Cambridge he had started to work on his edition of the Italic dialect remains which appeared in 1897. Both in Cardiff and in Manchester he continued to teach Comparative Philology and the Italic dialects, and, on occasion, Sanskrit. But after about 1895, despite the translation of Brugmann's *Grundriss*, which he produced in collaboration with W. H. D. Rouse, despite his two works on the Italic dialects (the second being a handy selection of texts for students), and despite his numerous articles contributed to the eleventh edition of the *Enc. Brit.* on connected subjects, of which that on the Latin Language afterwards grew into a little book called the *Making of Latin*, Conway's other manifold interests and activities prevented him from advancing his own knowledge with the advance of Comparative Philology itself.

The loss to the study of Comparative Philology in England was

great. At Cambridge Conway had come most under the influence of E. S. Roberts and of William Ridgeway, and he was no narrow logographer. His study of language, of Latin and kindred dialects in particular, was informed by a profound and vital human sympathy that enabled him to inspire an ancient text with a living interest that students and audiences everywhere found captivating. To the study of the language he always added the historical background of the people who spoke it, and brought them to life again. Before this achievement an occasional error of detail pales into insignificance. At Manchester, as previously at Cardiff, he exerted an enormous influence in favor of the Classics, and drew to himself, by the vigor of his forceful personality, a succession of students who afterwards went out as teachers into the schools ardent believers in the worth of the Classics, especially Latin, in a modern liberal education. This part of Conway's work will last long after him. With it must be reckoned also his long devotion to the Classical Association of England and Wales, as one of the founders, as secretary, as President, and also (for many years) as chairman of its Journals Board. He did yeoman service too in interpreting Latin authors, especially Vergil and Livy, to his own generation, not to scholars merely but to all sorts of men. To a young student, provided that he were willing to follow Conway's lead, Conway was ever generous, and he could and did many a time give a magnificent lead. Alert and active himself, he was intolerant of a slower pace in others, and sometimes impatient and quick tempered.

The list of his published work amounts to over a score of books and substantial monographs. Honors were numerous, and included honorary doctorates from Oxford, Padua, Dublin, and Manchester. He retired from active teaching in 1929, but already he had lectured in America, New Zealand, and Australia, and America he visited twice again. The year before his death he was Hibbert Lecturer. He was elected a Fellow of the British Academy in 1918. His edition of the Venetic inscriptions appeared posthumously, but he had himself completely revised it for the press and he was still actively engaged on his editions of Livy and of Vergil to within a month of his death which occurred in September 1933. There can seldom have been a teacher who has inspired his students with greater admiration for his methods and greater confidence in his knowledge than Conway did.

J. WHATMOUGH.

## SAMUEL McCHORD CROTHERS (1857-1927)

Fellow in Class III, Section 4, 1913

Samuel McChord Crothers died at his home in Cambridge, Mass., on November 7, 1927. He was elected a fellow of the Academy on May 14, 1913, as a member of Class III, Section 4.

Dr. Crothers was born in Oswego, Ill., June 7, 1857. He took his A.B. at Wittenberg College in 1873. He received the same degree from Princeton in 1874. He studied at Union Theological Seminary, 1874-77; and at Harvard Divinity School, 1881-82. He received the honorary degree of D.D. from Harvard University in 1899, and the honorary degree of Litt.D. from St. Lawrence University in 1904, from Princeton University in 1909, and from Western Reserve University in 1923.

He was ordained to the Presbyterian ministry in 1877 and in the years following held pastorates at Eureka, Nev., 1877-78, Gold Hill, Nev., 1878, and Santa Barbara, Cal., 1879-81.

In 1882 he entered the Unitarian ministry and held pastorates at Brattleboro, Vt., 1882-86, St. Paul, Minn., 1886-94. He became minister of the First Parish in Cambridge in 1894 and continued in that office over thirty three years.

Dr. Crothers was essentially a liberty loving soul. He owed fealty only to the inner light, and to that most imperious of all centers of authority he was implicitly obedient. His patent sincerity, his disarming simplicity, his want of worldly sophistication, his power to penetrate shams, and his insight into realities made him a preacher of power, a pastor of wide sympathies, and a beloved author.

In an age which was moving steadily in the direction of specialized knowledge and at a time when churches were putting undue faith in organization, Dr. Crothers exalted by spoken and written word, as by example, that wisdom which is more precious than knowledge and more effective than mechanism.

He was known throughout the land for his books. These fell for the most part within the pattern of the essay. Through that restricted and difficult medium he found his best expression. He was the only one of his contemporaries in this country who reminded us of Charles Lamb and who was in some very real degree qualified to perpetuate the tradition of *Elia*. He allowed himself in the essay a genial play of

humor, not untouched by subtle irony, which he forbade himself in the sermon. He refused to relax in the pulpit the high seriousness which he imputed to the preacher's office. This was with him a form of self-discipline in defense of an ideal. Those who knew him well discerned depths in the sermons, never plumbed by the essays, and loved the preacher even more than the essayist. His catholic Christianity found in the Unitarian ministry its most natural expression.

But to the wider world he was better known as the man of letters. He understood and loved America. He found the home of his maturity in New England and his genius had many affinities with the reserves and the understatement of the local tradition. But it was his mission, in part, to save us from provincialism and to spread before us the variety of American experience. His concern as a writer was with the *mores* of a people, their mental and moral second nature, their unrecognized idiosyncracies and their unsuspected possibilities. In so far as humor plays over his pages, it was invoked in the interests of an ultimate sobriety. He was never solemn, but he was always serious. He loved all sorts and conditions of men and had the power to make them see themselves, and, after the initial surprise, to believe in themselves. There was no root of bitterness in him, and his genial spirit—like the sun in the fable—was stronger than the blasts of reckless invective which have been sweeping back and forth across the country for the last half century.

Dr. Crothers was, in short, a humanist after the elder pattern, his humanism being rooted and grounded in a liberal faith in God. Whatever his day-by-day occupation or concern he was a minister of light and hope.

He married on Sept. 9, 1882, Louise M. Bronson of Santa Barbara, Cal. He is survived by his widow and by two daughters—Katharine and Marjorie, and two sons—Gordon and Bronson Crothers.

WILLARD L. SPERRY.

#### EDWARD SALISBURY DANA (1849-1935)

Fellow in Class II, Section 1, 1893

Edward Salisbury Dana was born in New Haven, Connecticut, November 16, 1849. He died in New Haven June 16, 1935.

The son of James Dwight Dana and Henrietta Frances Silliman, Dana inherited from both parents a strong scientific bent. From

his school days in the Hopkins Grammar School in New Haven when he was already interested in botany to the end of his life, natural science was his major interest. And the field in which he labored most continuously throughout his long life was the administration and editing of the *American Journal of Science*. From 1875 until 1926, when it was turned over to Yale University, this journal was the property of the Dana family and was carried on by E. S. Dana, in spite of financial difficulties, as a family responsibility.

Dana graduated from Yale College in 1870 and then spent two years in the Sheffield Scientific School. The following two years were spent in European universities, chiefly at Vienna, where he established lifelong friendships with his teachers. Returning to New Haven, he was made successively tutor in Mathematics, Physics and Chemistry, Assistant Professor in Natural Philosophy, and in 1890 Professor of Physics, holding that chair until his retirement in 1917. The most distinguished mineralogist that America has produced, Dana never held a chair in Mineralogy!

Dana's mineralogical publications began in 1872 while he was a student at Vienna. Without attempting to enumerate the many special papers and books on Mineralogy, Geology and Physics which followed, it is enough to mention here his greatest work, "The System of Mineralogy," published in 1892. This was the sixth edition of a work of like name, originally published in 1837 by his father. But the book was wholly rewritten and much enlarged over preceding editions. And so admirably was the work done and so exact was its presentation of the data of mineralogy that it at once took its place as the major work of reference in that science the world over. "The System" has well been called the Bible of Mineralogists. It is still, after forty-five years, the best available work of reference. The preparation of a new edition, now progressing slowly at the hands of a group of workers in the field, is guided by the express desire of mineralogists in every country that the essential form of the sixth edition be preserved as far as possible.

A detailed account of Dana's life and work at Yale, written by his colleague, Charles Schuchert, is to be found in the *American Journal of Science* for September 1935. A bibliography of his publications may be consulted in Bulletin 746 of the U. S. Geological Survey.

CHARLES PALACHE.

## HUGO DE VRIES (1848-1935)

Foreign Honorary Member in Class II, Section 2, 1921

In 1918 the University of Amsterdam relieved from active duty a man who had directed its botanical activities for 32 years,—Hugo de Vries. He was a man whose attainments had brought him many distinctions, whose personality had brought him hosts of friends, a man whose experimental ingenuity had made possible two of the greatest generalizations of physical chemistry, and whose influence had induced the intellectual world to regard evolution as a matter capable of objective test rather than merely a rationalistic hypothesis. By his accomplishments, De Vries deserved this rest from arduous duty; but this was reckoning without the spirit of the man. Freedom from set duties was opportunity. He retired to Lunteren, built a laboratory, created an experimental garden, and went about his genetical work with the enthusiasm ordinarily expected only of youth. There he labored patiently for 17 years. And when death's call came on May 21, 1935, he had concrete plans for investigations that would have taken another decade to complete. Truly, here was a man!

Hugo de Vries was born in Haarlem, Holland, on February 16, 1848. His father was Secretary of the northern province and later Minister of Justice for the whole country. His mother was the daughter of Professor Reuvens of the University of Leiden. Thus his genetic inheritance and his environment were all that might be desired. As was to be expected, therefore, young De Vries showed early promise of attainment. At 13, he won a school prize for the best collection of plants from the vicinity of Haarlem, and at 21 he received a gold medal from the University of Groningen for an essay having the title "Über die Wirkung der Wärme auf der Wurzeln der Pflanzen."

De Vries obtained his doctorate from Leiden in 1870, at a time when war was still being waged over the *Origin of Species* issued by Darwin eleven years before; and, according to Stomps, the young man showed a sympathy with the new point of view that was not wholly agreeable to some of his teachers. After a post-doctorate year at Heidelberg under Hofmeister, De Vries returned to Holland and taught at the Hoogere Burger School and at the Handelschool in Amsterdam for four years. Every vacation during this period he spent in Würzburg with Sachs. His work at Würzburg resulted in a call to Ger-

many to investigate certain physiological problems connected with the growing of the important crop plants, red clover, sugar beets, and potatoes. In 1877, he became privat-dozent at Halle under the distinguished plant pathologist, Julius Kühn. But he remained there only part of a year, returning to Amsterdam to become lecturer on plant physiology at the University. He continued his connection with Amsterdam University for 41 years as Lecturer, Professor Extraordinarius, Professor Ordinarius, and Director of the Botanical Institute.

De Vries had two separate careers in science, one as a physiologist and one as a geneticist. In each field he was an outstanding figure. In each he was a pioneer. He is better known in the department of genetics where he was a stimulating leader for 35 years; but it is quite possible that the historians of science will rate his contributions on turgor and osmosis as having the more lasting value. Such a judgement would not be strange. The early work in genetics necessarily involved phenomena where many variables were concerned, and tentative conclusions changed rapidly. But the work on cell physics and cell chemistry dealt with phenomena of an apparently simpler nature, where rigid control was feasible, and where interpretation was possible in the relatively static terms of the physical sciences.

The researches of De Vries, entitled *Untersuchungen über die mechanischen Ursachen der Zellstreckung*, published in 1877—together with the *Osmotische Untersuchungen* of Pfeffer, published the same year—led directly to van't Hof's generalization that the fundamental gas laws apply equally well to dilute solutions. Equally important contributions along the same line had great influence on the young Arrhenius in the preparation of his doctoral dissertation, where he enunciated the theory of electrolytic dissociation.

De Vries employed the living cell as the apparatus by which to study osmotic phenomena; and his plasmolytic method is still one of the most sensitive laboratory methods available to plant physiologists. By this means he was able to determine empirically the percentage of various dissolved substances which gave equivalent osmotic effects. There was great variation in the quantities necessary; and at first sight these quantities appeared to follow no law. But with sufficient data at hand, De Vries was able to show that isosmotic concentrations depend upon the solution of identical numbers of molecules. Thus

when the number of grams of various substances indicated by their molecular weights is dissolved in a liter of water (G. M. solution), these solutions, if the cell membrane is permeable to them, give equivalent plasmolytic effects.

As a consequence of the establishment of the law that "equimolecular solutions are isotonic," it became possible to use the plasmolytic method for the determination of molecular weights of certain substances which at the time could not be fixed by chemical means. For example, chemists had suggested three different molecular weights for raffinose, viz., 396, 594, and 1188. De Vries proved that a 5.951 per cent solution is isotonic and therefore equimolecular with a 3.42 per cent solution of cane sugar. Raffinose is thus a trisaccharide having a molecular weight of  $C_{18}H_{32}O_{16} + 5H_2O$ .

While his interest in matters connected with osmosis was still at its height, De Vries began to be more actively concerned with the broader problems of variability, heredity, and evolution. He collected and studied variant material of a number of plant genera, and in the eighties began to make minute observations on controlled populations. One of the species which he found to be particularly intriguing, because of the type of variability shown, was a supposedly American evening primrose, *Oenothera Lamarckiana*. On this plant and its relatives, he concentrated his attention for well over half a century.

Though the most conspicuous trait of De Vries, throughout life, was his demand for the same concrete specific evidence in genetic research that he had required in his physico-chemical researches, nevertheless his mind was restless. While waiting for experimental results that were slow in coming, therefore, he began to speculate on the philosophical requirements for an hereditary mechanism. The results of his conjectures were brought together in a small volume called *Intracellular Pangenesis*, issued in 1889. The conception was an outgrowth of Darwin's ideas of pangenesis and of Weismann's *Kontinuität des Keimplasmas* (1885) in many respects; but it more nearly anticipated our modern notions than either. De Vries himself said later that he based his "testing of native plants on the hypothesis of unit characters as deduced from Darwin's Pangenesis." But such credit was rather more than was Darwin's due. De Vries had observed what we now call the results of gene segregation; and it was only natural that a man with chemical training should attribute these

phenomena to the action of hereditary units. One may assume, therefore, that his conclusions would not have been different had he been unacquainted with the works of both Darwin and Weismann. He simply assumed reproducible units of heredity within the nuclei of all cells, whose activity was manifested only when they or their products passed into the cytoplasm. Variation was the result of change in either number or quality of the pangenes.

De Vries discovered for himself the ratios exhibited by the selfed progeny of monohybrids, by studying controlled hybrids from such genera as *Chelidonium*, *Datura*, *Solanum*, *Veronica*, and *Zea*. To these results he gave the correct interpretation, though the analysis had not the elegant precision of Mendel's paper. Mendel's own forgotten work he rediscovered in 1900 (as at the same time did Correns and von Tschermak) by means of a reference found in L. H. Bailey's book on Plant Breeding (1895). These results were presented to the German Botanical Society under the title "*Das Spaltungsgesetz der Bastarde*," and to the French Academy of Sciences under the title "*Sur la loi de disjonction des hybrides*"; and from that date the growth of genetics was rapid.

In 1901-1903 De Vries published his great work, *Die Mutations-theorie*. The first volume was on *Die Entstehung der Arten durch Mutation*; the second volume was *Elementare Bastardlehre*. Much of its substance was afterwards issued in English under the title "Species and varieties, their origin by mutation." Other later books included *Plant Breeding*; comments on the experiments of Nilsson and Burband (1907), *Gruppenweise Artbildung, unter spezieller Berücksichtigung der Gattung Oenothera* (1913). In addition, 189 of his scientific papers up to 1925 were collected in seven volumes containing 4300 pages, under the title "*Hugo de Vries: Opera e periodicis collata*."

It was not to be expected that the analyses of the numerous genetic problems considered in this tremendous quantity of published work should stand the test of time. The special puzzle presented by the genus *Oenothera* has been solved along other lines than those originally suggested. But it was the work of De Vries that made solution possible. His contributions were fundamental. Evolutionists to-day do not accept the picture drawn in *Die Mutationstheorie*. The word *mutation* has taken on some rather "undevriesian" connotations. That is what De Vries would want. He was not a static entity. He

grew and changed, as science grew and changed. To the end his mind was facile. No one was better pleased than he when a problem he had posed was solved. He was a great thinker, a stimulating leader, a man who radiated ideas and passed them to his fellows. He was a worthy heir to Darwin's mantle. Without his example, the development of genetics would have been delayed for years.

Many honors came to De Vries, particularly in England and the United States. He received the Darwin Medal in 1906, the Vietsch Medal of the Royal Horticultural Society in 1910, and the Gold Medal of the Linnaean Society in 1929. Honorary degrees were conferred upon him by four universities in America and by five universities in Europe. Some three score learned societies counted it an honor to enroll his name. He was elected a foreign honorary member of the American Academy of Arts and Sciences in 1921.

De Vries visited the United States on three occasions. In 1904 he delivered the principal address at the opening of the Station for Experimental Evolution of the Carnegie Institution of Washington. He then proceeded to the University of California, where he gave a course of lectures which did more to stimulate experimental biology in America than had the efforts of any other one man. He lectured at American universities again in 1906, and still again in 1912, when he opened the Rice Institute at Houston, Texas.

In these American trips, De Vries endeared himself to every biologist with whom he came in contact. He was a lovable man, quiet and dignified, but kindly and genial.

E. M. EAST.

#### ROLAND BURRAGE DIXON (1875-1934)

Fellow in Class IV, Section 2, 1910

Roland Burrage Dixon, the senior member of the Division of Anthropology of Harvard University, died at his home in Harvard, Massachusetts, on the nineteenth of December, 1934. Dr. Dixon was born at Worcester, Massachusetts, on November 6, 1875. He graduated from Harvard College in 1897 and three years later took his doctorate in Anthropology at that institution. From his senior year in college to his death Dixon taught Anthropology to Harvard students and to graduates of institutions in many parts of the world

who came to share in his enormous store of erudition. Before Dixon's time instruction in Anthropology at Harvard was somewhat haphazard and unsystematic. Courses were attended casually by some undergraduates and assiduously by an occasional graduate student with professional ambition. Dixon set himself to organize a complete anthropological curriculum and to gather together a teaching staff which would be competent to give advanced instruction and to direct research in all specialties of the science. He built up at Harvard a school for the training of professional anthropologists which was worthy of the academic traditions of the University and from which have gone out many able workers in the field of American Anthropology.

Dixon was passionately devoted to an ideal of anthropological scholarship which insisted upon a thorough factual and theoretical knowledge of all aspects of the science as a foundation upon which to specialize. Consequently every aspirant for the Harvard doctorate in Anthropology was forced to submit himself to a rigorous course of training in subjects other than those in which he happened to be particularly interested. It mattered not how brilliant a man might be in Physical Anthropology, for instance; he nevertheless had to pass a severe examination in Archaeology and Ethnology, before he could offer a thesis in his specialty. By his uncompromising insistence upon this standard Dixon either corrected or discouraged lop-sided enthusiasts and made the Harvard doctorate one of the coveted and respected degrees in Anthropology.

As a teacher, Dixon was always edifying, often stimulating, but rarely entertaining. Each lecture hour was a sixty minute sprint through a huge territory of carefully organized knowledge, which left most of his auditors who held the pace mentally exhausted, or, at best, doubled up with writer's cramp. Yet the graduate student who survived these factual Marathons, found himself equipped with a thesaurus of anthropological knowledge which he could utilize throughout his entire professional career, both as a solid background for his own research and as a powerful weapon against less substantially educated adversaries. Dixon was an admirable director of the research of advanced students. In this capacity he was compelling, exacting, and critical. He gave to each research student a full hour of his time every week, during which the latter presented the results of his work, and the former analyzed, discussed, probed, diagnosed,

and administered, if, necessary, a mental cathartic. Dixon's doses were never graduated according to the age or capacity of the patient; he gave the same strong and copious medicine to all. He never tempered the wind to the shorn lamb.

Yet Dixon was a just and by no means ruthless man. His fairness and sound judgement were never more evident than in the inquisition of doctoral examinations. His verdict upon a candidate generally carried the jury of his colleagues, because he was absolutely impersonal, totally honest, and completely dominated by his very clear conception of the requisites of professional Anthropology.

One of Dixon's most substantial achievements is the anthropological library of the Peabody Museum. The unique feature of this collection is the completeness of its catalogue. Full sets of virtually all anthropological periodicals are indexed not only by year and by volume, as in most other libraries, but by individual authors and by subjects. Thus if an investigator wishes to obtain a bibliography on, for example, totemism, he will find under that heading in the subject catalogue nearly all books and articles on the subject found in anthropological literature. This cataloguing system, devised by Dixon and developed under his supervision, has made the Peabody Museum Library one of the most useful collections of its kind in the world. The colossal task of keeping up this cataloguing system upon a very scanty budget and of selecting volumes for purchase, as well as arranging exchanges, absorbed a great deal of the time and energy of Dixon for more than thirty years. It was one of those thankless jobs, which no one else was willing to undertake, but which Dixon performed with characteristic thoroughness and efficiency, thus creating for students of Anthropology an unrivalled instrument of research.

Dixon produced, of course, a formidable list of technical papers on anthropological subjects, all scholarly and for the most part rather uninteresting. But in 1923 he published his *Racial History of Man*, which was one of the most venturesome and original forays into the field of Physical Anthropology (not his own field) ever undertaken by a recognized authority in the general subject. It was, in fact, a sort of single-handed "Charge of the Light Brigade." Certainly, cannon to right of him, cannon to left of him, cannon in front of him (as well as a few behind) volleyed and thundered. Here is not the place to expound or to dissect Dixon's superlatively original scheme

of classifying mankind on the basis of combinations of certain cranial indices in individuals. It called down upon him almost universal condemnation; it was as permeable as a sieve; and yet when he had passed through this sieve, with his inimitable industry, virtually all recorded crania from every region of the world, he produced for the first time an intelligible and consistent interpretation of the migrations of peoples and mixtures of strains which have brought about the present distribution of the world's population. With his home-made pop-gun he scored more bull's eyes than have all the anthropological artillerymen with their high-power, precision pieces. Of course he missed the mark entirely a great many times, but he succeeded in writing what I believe to be the most stimulating and provocative work on Anthropology which has appeared since Darwin's *Descent of Man*. The *Racial History of Man* will be read (and probably cursed) for many years after the acclamations of more conventional anthropological treatises have died away.

As befits the anthropologist, Roland Dixon at various times wandered up and down in the far parts of the earth studying primitive peoples. Nevertheless he was singularly uninterested in his fellow human beings, although he spent his life studying them. He was preoccupied rather with their cultures and the probable methods of cultural diffusion. His real love was Nature and out-of-doors life. He spent many summers camping and tramping with one or another of his few intimate friends. He was so much the complete bachelor that one was inclined to regard his state as the manifestation of a congenital aversion for the other sex. Nor did he cultivate many close friendships among his fellow males. He was courteous, kindly, but withdrawn. Probably only two or three persons were really permitted to know this lonely scholar—certainly none of his departmental colleagues, although he was on terms of easy familiarity with them all and enjoyed their confidence and respect.

Here then was a shy and unpretentious scientist who in some respects approximated, if not achieved, greatness. At a minimum estimate he was one of the most useful and influential anthropologists of his generation, a teacher and investigator of whom his university and his associates were fittingly proud. For the last three years of his life, he pursued his work in the torture of a wasting disease, the very existence of which he refused to admit, perhaps because he could not

endure to be the object of expressions of sympathy. He dragged himself to his lectures and performed his appointed duties until he collapsed in the Peabody Museum. Thus passed Roland Burrage Dixon, whom no single anthropologist can replace.

E. A. HOOTON.

### LOUIS DOLLO (1857-1931)

Foreign Honorary Member in Class II, Section 3, 1928

Louis Dollo was born at Lille, in Flanders, the 7 December 1857 and died, after a long illness, at Uccle, near Brussels, the 19 April 1931.

Dollo studied at the University of Lille, 1873-1877, where he graduated as a civil engineer. He pursued at the university studies in geology and zoology and for many years came under the influence of the brilliant anatomist, Paul Albrecht, who was a student of Gegenhaur's.

After a brief period in industrial work Dollo, under the influence of Kowalewsky, became a palaeontologist. Following his inclinations, in 1882, Dollo was appointed assistant in the Royal Museum of Natural History in Brussels. Later, in 1891, he was appointed conservator and he remained at the Brussels Museum occupied with research and museum work until his retirement in 1925, covering a period of 47 years. In addition to work at the Museum, in 1909 he became Professor of Palaeontology at the University of Brussels.

Dollo came to the Brussels Museum to study and work on the great collection of fossil reptiles for which that museum is famous; later he took over all the fossil vertebrates. He built up an osteological collection for comparative study. He supervised the preparation and mounting of many specimens in the Brussels Museum including the superb series of Iguanodons from Bernissart which is one of the most splendid displays of any Museum in the world. By his masterly analysis of Mesozoic and Tertiary reptiles he rendered the museum signal service. He arranged and labeled the unique collection of fossil vertebrates in the New Brussels Museum, which was opened in 1905, and prepared a general guide book to the recent and fossil vertebrates in the museum.

Dollo as an investigator will always be remembered for his numerous valuable contributions to our knowledge of fossil vertebrates. While

his work was primarily on the fossil reptiles of Belgium, especially Mososaurs and Iguanodons, he published numerous papers on other reptiles, also on fossil fishes, birds and mammals, as well as on many groups of fossil invertebrates. After the voyage of the Belgica he published as well on Antarctic deep-sea fishes.

Dollo belonged to the great school of morphologists of the last century, and the structure and anatomical relations of his material were constantly in his mind. He urged that palaeontology should be considered as a biological study, rather than be associated with geology. He was essentially philosophical in his work and published much on evolution. He established the general principle that in evolution an animal never returns to its former state, even if in circumstances identical with those through which it has passed. He described this as the law of irreversibility of evolution and it is sometimes called Dollo's law. He also urged the importance of "Ethology" or the relation of organisms to their surroundings. In addition to his technical scientific work Dollo was deeply interested in the study of languages, and in biochemistry, and he was a lover of music.

An appreciative notice of Dr. Dollo was published in *Nature*, 1931, vol. 128, p. 57 and another in *Bull. Mus. Royale d'Hist. Nat. de Belgique*, 1933, vol. 9, no. 1. In this last an extensive bibliography of his writings is given, including some 475 titles. Dr. Dollo was deeply admired and received wide recognition for his work. He was a foreign member of the Linnean, Geological and Zoological Societies of London, and was awarded the Murchison Medal of the Geological Society. He was also an honorary Sc.D. of Cambridge, and a corresponding member of the Academies of Science of Berlin, Munich, and New York.

ROBERT T. JACKSON.

### WILLIAM DUANE (1872-1935)

Fellow in Class I, Section 2, 1914

William Duane came of distinguished ancestry. He was a descendant in the fifth generation from Benjamin Franklin, the family line running as follows:

Sarah, a daughter of Franklin, married Richard Bache, a native of England. The sixth child of this pair, Deborah, married William

John Duane. William Duane, the oldest of nine children of this union, married Louisa Brooks. From this marriage there were two children, a son and a daughter; the son, Charles William, was rector of St. Andrew's Church in West Philadelphia and he was the father of William Duane, the subject of this biographical note. From Franklin down the family lived in or near Philadelphia. From Richard and Sarah Bache was descended also, in the second generation, Alexander Dallas Bache, Superintendent of the United States Coast Survey for many years and one of the founders of the National Academy of Sciences. William John Duane was the son of the William Duane who, as editor of the Philadelphia *Aurora*, was influential in bringing on the War of 1812. William John Duane was Secretary of the Treasury under President Jackson but resigned or was dismissed from his office after refusing to remove the government deposits from the United States Bank at the order of the President.

Our William Duane was born in Philadelphia February 17, 1872. He received the degree of A.B. from the University of Pennsylvania in 1892 and from Harvard a year later. After two years as an assistant in physics at Harvard he went to Germany as holder of the Tyndall Fellowship, and in 1897 he was given the degree of Ph.D. at Berlin. He was Professor of Physics at the University of Colorado from 1898 to 1907, was engaged in research at the Curie Radium Laboratory in Paris from 1908 to 1913, became Assistant Professor of Physics and Research Fellow of the Cancer Commission at Harvard in 1913, and Professor of Bio-Physics in 1917, a title which he held till his death, though because of illness he was emeritus during the last year of his life.

In his early years at Harvard he was engaged with Professor Trowbridge in a research on the velocity of electric waves along wires. His thesis for the doctorate was on a subject in physical chemistry, a study of thermo-electrolytic action. During his professorship at the University of Colorado he probably had little opportunity for research. His experimental work in Paris produced several papers which were published in the *Comptes Rendus* of the Académie des Sciences during the years 1909-1912, all under the general heading of radioactivity.

It does not appear that during his residence in Paris he had given any especial attention to the therapeutic value of the various new found "rays," but his studies there had made him proficient in the

technique of producing and directing such rays, and his native ability enabled him speedily to adapt his attainments to the requirements of his new professorship, probably the first of its kind in America. He soon became an authority on the means for applying "radium emanation," and later X-rays, to the treatment of cancerous growths.

His duties at the Medical School did not, however, occupy all of his time or energy, and he continued at the Jefferson Laboratory his investigations of the purely physical or chemical properties and effects of the new forms of radiation, especially those of the X-rays. He published, sometimes in cooperation with student assistants, many papers descriptive of his experimental methods and the results obtained. A considerable number of these papers dealt with the medical aspects of his work.

In 1922 he received two prizes in recognition of the value of his achievements. One of these, the Leonard prize, came from the American Roentgen-Ray Society, which appears to have been an association of those making a medical use of X-rays and to be no longer active. Concerning the other prize, the *New York Times* of April 9, 1922, states that Professor Duane "has been awarded the John Scott medal and certificate, with a premium of \$800, by the Board of Directors of City Trusts of Philadelphia for his researches in radio-activity and X-rays." It adds, "This award is made annually for scientific achievement in accordance with the terms of a bequest made over a century ago by John Scott. Last year the winner was Mme. Curie." Apparently the medical side of Duane's activities was given especial attention as a ground for this award.

In 1923 he was given the Comstock prize of the National Academy of Sciences. This prize, awarded once in five years, is a very great honor and in addition it brings to its recipient a substantial sum of money, approximately the accumulated income of a \$12,000 fund.

He was a member of the National Academy of Sciences, of the American Philosophical Society, and of many other associations, scientific or medical.

He married in 1899 Caroline Elise Ravenel of Charleston, South Carolina. Of this union there have been four children, William, Arthur Ravenel (now deceased), John, and Margaretta.

Duane was in seriously failing health and comparatively inactive for some years before his death. His most noticeable characteristic

was quietness. He never raised his voice, never seemed excited or hurried. He was quietly courteous, quietly friendly, quietly efficient. He was a lovable man and a worthy descendant of his famous ancestors.

EDWIN H. HALL.

### EDWARD WALDO EMERSON (1844-1930)

Fellow in Class III, Section 4, 1917

Edward Waldo Emerson, born on July 10, 1844 in Concord, was the youngest of the four children of Ralph Waldo Emerson. Like his mother, young Edward was not physically robust. The oldest son died when very young. The other three children grew up in the Concord of the latter half of the nineteenth century. Their father, who was forty-one years old when Edward was born and who died when his son was thirty-seven, lived at home most of the time. When he was away on his lecturing tours Mr. Thoreau, then a young man, sometimes lived in the Emerson house and occupied the position of elder brother or uncle to the children, and gained their affection by his remarkable personality and his great kindness to them. They also knew the Hawthornes, the Alcotts, and the other notable people of Concord.

At school and college young Edward was studious and intelligent, but not brilliant. A strong love for literature, poetry, and art distinguished him, and from his youth onwards the knights and the chivalry of the middle ages fascinated him. In fact he was interested in soldiers of all periods and had himself a strong military instinct. Doubtless the knightly qualities in his own character—his gentleness and courage—owed something to that life-long interest. He not only learned to ride early and was a good horseman all his life, but was also at home on the river in swimming, skating, rowing, and later in life in canoeing.

In July, 1861, he passed his examinations for Harvard and entered college in the autumn at the age of 17. But at the end of seven weeks, failing health forced him to leave college and return to Concord, where he spent the winter at home. An out-door life with a surveying party combined with woodchopping helped to put him on his feet again. In May 1862, to build up his health, he took the train to Omaha and, accompanied by a doctor friend, rode over the Emigrant Trail across

the continent. He made the last part of the journey by stage coach and returned by way of Panama. The next year with renewed strength he re-entered Harvard, in the Class of 1866, and after the usual four years of college life was chosen class poet at graduation.

Probably the greatest disappointment of his life was his failure to get into the Northern Army in the Civil War. Though eager to go, his family and friends opposed his offering himself because they felt that his health was too delicate; their judgement was borne out by the fact that during the War he was twice drafted and twice rejected by the medical officers for physical unfitness.

After graduating from Harvard he went out to Burlington, Iowa, and worked as a clerk in the office of the Burlington and Missouri Railroad; but after a while his eyes troubled him and caused his return to Concord. Soon afterwards, ill health, so frequently his enemy in those early years, again attacked him, this time in the form of a serious illness with complications which, together with a long convalescence, held him back once more. But out-of-door life and work in a vineyard so restored his health that he was able to enter the Harvard Medical School in the autumn of 1868, and after nearly six years of study there and in Berlin and London, he received his M.D. degree from Harvard in 1874. He began practice as the assistant of Dr. Josiah Bartlett of Concord. After Dr. Bartlett retired, Dr. Emerson became the country doctor of Concord, with a scattered practice also in Bedford, Lincoln, Acton, and other nearby towns; visiting his patients on horseback or in a buggy, and in winter by sleigh.

In September, 1874, he married Annie Shepard Keyes of Concord, and with her began a long and happy married life.

Their first three children, all sons, died when very young. The four remaining children grew up and three of them married, but only one, his youngest son Raymond, has survived the father.

Dr. Emerson's intimate friends knew that he wished to be an artist rather than a physician, but he chose medicine as a career at the wish of his father, partly because it was felt to be necessary that he should earn his living, and in those days the chance of earning a living by art was very slight.

Many stories could be told of Dr. Emerson's life as a country physician, and of his gallantry and self-sacrifice under all circum-

stances. Once, at night, his horse fell with him and pinned him in a snowdrift with a broken leg and no one near, but he managed to drag himself free, mount again, and get home. He was decidedly successful as a country family doctor, and won the love and respect of his patients.

In 1882, when his father died, he discontinued his practice of medicine except as a consulting physician, and for a while devoted his time principally to the study of art. He began by working with his classmate, Frederick Crowninshield, and studied at the School of the Museum of Fine Arts in Boston, and in the winter of 1885-86 was appointed instructor in Art Anatomy in that school, a position which he held for twenty years.

Dr. Emerson was a good draughtsman and understood well both human and animal anatomy, and further had a strong love of the poetry which he saw in the visible world and which gave him his chief inspiration to paint; but partly perhaps because his inexorable conscience would not let him paint when it was his duty to study—in school, college, or medical school—and later to practice medicine, he never achieved distinction as an artist. In the spring of 1896 he held his only exhibition of paintings. It was moderately successful and, though most of the pictures were loans, some of those that were not thus reserved were sold.

His gift as a writer and lecturer brought him greater reputation. He was frequently asked to lecture in the West as well as in New England. In 1882 he was made an honorary member of the Phi Beta Kappa, and fifteen years later was invited to read a poem at the June meeting of the Harvard chapter. In 1882, not long before he gave up the practice of medicine, he read before a Medical Society a paper on "The Man as Doctor." Fifty years later, Dr. Henry P. Walcott said that that lecture was a masterpiece and produced a great impression on the doctors of that day.

Dr. Emerson also wrote various other articles which have been collected since his death and published by his son Raymond under the title of "Essays, Addresses, and Poems." The collection includes "The Chaplain of the Revolution," the subject of which was his great grandfather, who lost his life in the Revolutionary War, and contains also "A History of the Gift of Painless Surgery," published in the "Atlantic Monthly" in 1896, in which Dr. Emerson tells the story

of the discovery of the use of ether for medical purposes by his mother's brother, Dr. Charles T. Jackson, who taught it to Dr. Morton and thus made him famous for first demonstrating the discovery at the Massachusetts General Hospital.

Dr. Emerson also wrote two or three books, one entitled "Emerson in Concord" which gives the picture of his father's life in Concord as a neighbor and friend, and so supplements Mr. Cabot's more elaborate work which deals with the life of the elder Emerson as a philosopher and poet. He wrote also a life of Colonel Charles Russell Lowell, the gallant soldier who lost his life in the Civil War Battle of Cedar Creek.

Among his other writings were: additional essays about his father, a short account of his personal reminiscences of Henry Thoreau, and the life of Judge Ebenezer Rockwood Hoar in collaboration with Mr. Moorfield Storey.

Dr. Emerson's most important work was the editing of his father's writings and journals. Mr. James Eliot Cabot had helped Ralph Waldo Emerson during his lifetime to bring forth the first complete edition of his essays and poems. In 1903, some twenty years later, Dr. Edward Emerson brought out the Centenary Edition of his father's works, with carefully written notes, and during the next ten or twelve years, with the assistance of his nephew, Waldo Emerson Forbes, he brought forth the ten volume edition of his father's journals, a great labor. His last work was the book entitled "The Early Years of the Saturday Club," an organization to which both he and his father belonged. His history of the coming together of that well known group of writers and other distinguished men in Boston in 1857 and the years following, included not only short biographical sketches by himself but also a few by other members of the Club.

In all these various publications, notably of his father's works, he showed himself to be conspicuous for good taste and sound judgement and for his ability to make pithy notes and comments on the text.

Most of his married life was spent in Concord. As a public-spirited citizen, he cheerfully took his part in the civic work of the town. He served faithfully on the School, Cemetery, and Library Committees, was chairman of the board of health, and also held positions in connection with State Institutions. In 1889 he was elected a member of the Saturday Club and in 1917 became a member of the American Academy of Arts and Sciences. During the Great War he joined the

"Concord Minute Men," a purely voluntary organization which was established as a part of the preparedness movement. He drilled in the State Armory with them, though he was then seventy-two years old.

He visited Europe twice after his marriage; for nearly two years in 1893 with his whole family, and later with his wife and eldest daughter and some friends in 1905. As he grew older the South proved a pleasant retreat from the severity of the New England winters. He died in Concord on January 27, 1930 at the age of eighty-five.

His whole life was characterized by great gentleness, consideration and generosity, combined with an absolutely unflinching devotion to duty, and a courage that had never given way. His innate refinement and his enthusiasm for what was beautiful in literature and art, both romantic and classic, were conspicuous. His father had said "Character is greater than intellect." When, towards the end, Dr. Emerson's mind and body began to weaken noticeably, his character, which had always shown a granite-like strength, remained. During those last protected days in the quiet town of Concord, it was the courtesy and consideration rather than the strength that was visible.

EDWARD W. FORBES.

#### JESSE WALTER FEWKES (1850-1930)

Fellow in Class III, Section 2, 1887

Jesse Walter Fewkes, son of Jesse and Susan Emeline (Jewett) Fewkes, was born in Newton, Massachusetts on November 14, 1850 and died in Washington, D. C. on May 31, 1930. He was graduated from Harvard College in 1875 with membership in Phi Beta Kappa. During his undergraduate career he was a member of the Agassiz school at Penikese Island. His work with Agassiz in the Graduate School led to the Master's and Doctor's degrees. For three years he studied zoölogy at Leipzig and under the Harris Fellowship spent several months at Naples and Villa France perfecting himself as a marine zoölogist. An appointment as assistant in the Museum of Comparative Zoölogy at Harvard followed his European training.

Paralleling the history of his life-long friend and colleague, Frederic Ward Putnam, his interests turned from zoölogy to American archaeology and ethnology. In 1889, under the patronage of Mrs. Mary

Hemenway and the Peabody Museum, he began his first work in the Southwest at Zuñi Pueblo, New Mexico. He was the first to record by phonograph Indian songs. The ceremonials of the Pueblo tribes, more especially the Smoke Dance, attracted him. This led to a study of the mythology and the traditions of the Hopi Indians and, pushing backward in time, the archaeology of the Southwest became his main interest.

From the time of his connection with the Bureau of American Ethnology at Washington in 1895 until almost up to the time of his death he was continuously engaged in excavations in the Southwest. He became especially interested in the pottery designs and their interpretations. The extensive and documented collections in the United States National Museum bear witness to this long-continued investigation. His repairs to the famous Mesa Verde and Casa Grande ruins will forever be monuments to his activity in the preservation of American antiquities.

Excavations in the West Indies, Porto Rico and the Lower Antilles, and explorations along the Gulf Coast of Mexico were followed by important papers on these practically virgin fields. In 1918 he was appointed Chief of the Bureau of Ethnology.

Dr. Fewkes was the recipient of many honors, among them a Knighthood in the Royal Order of Isabella la Catolica from Spain, the gold medal "*Litteris et artibus*" from Sweden, an LL.D. from the University of Arizona, and membership in the American Academy of Arts and Sciences and the National Academy of Sciences.

His career as a marine biologist is told in sixty-nine entries in his bibliography, and as an anthropologist in a far greater number of important articles and memoirs.

Fewkes was a natural historian in the best sense of the word. His broad interests served him well in the varied approaches to anthropological problems. However, to the newer techniques of archaeology and of anthropology he could never quite adjust himself. Nevertheless, his work will always stand as the first basic attempt to understand the prehistory and the history of the peoples of our southwestern deserts.

ALFRED M. TOZZER.

## JOHN GALSWORTHY (1867-1933)

Foreign Honorary Member in Class IV, Section 4, 1931

John Galsworthy, who was elected a Foreign Honorary Member of the Academy on May 13, 1931, died January 31, 1933.

He was born in 1867, of an old Devonshire family, went from Harrow to Oxford, studied law and travelled. But chiefly he wrote, from 1897, when his first work appeared, under a pseudonym, until *Over the River* closed the great Forsyte series in 1933. The resulting body of novels, plays, short stories, sketches, poems, and letters will not soon cease to inspire all good workmen, whatever may be their special calling. For all that he did and was Galsworthy deserved and received many honors, though he was not able to accept all the distinctions that were offered. Honorary degrees came to him from St. Andrews, Manchester, Dublin, Sheffield, Oxford, and Princeton; the O. M. was awarded him in 1929 "for services to literature and the drama." The Nobel Prize was also awarded him, but ill health prevented his going to Stockholm to receive it. He declined knighthood in 1918.

Galsworthy's aim—characteristically put by him in the third person—was simple, exacting, and appropriate: he wished "to present truth as he sees it, and gripping with it his readers or his audience, to produce in them a sort of mental and moral ferment, whereby vision may be enlarged, imagination livened, and understanding promoted." This aim Galsworthy was able to realize because in him great artistic gifts were joined with a remarkable endowment and balance of human qualities.

The justice which presides over his work has more than a little that is Greek about it: "all are bound to their own natures, and what a man has most desired shall in the end enslave him." Thus his plots seem to unroll without the author's manipulation, always in the direction of a "doom" which is strangely inevitable on account of the skill with which it is made to seem the negative of the virtues punctiliously granted to each class. The art is quite marvellous with which, as from a chorus, public opinion is made to surround the central action: "Society stands to the modern individual as the gods and other elemental forces stood to the individual Greek."

But in Galsworthy justice is constantly balanced by sympathy.

His hatred of cruelty is intense: "of all attributes of the human creature," he says, "cruelty is to me the most abhorrent." At the end of *Swan Song* he can think of nothing more poignant to compare Fleur with, after her father's death and her terrible remorse, than a bird that "had been shot with both barrels, and still lived; no one with any sporting instinct could have hurt it further. Nothing for it," thinks the wronged but deeply chivalrous Michael, "but to pick her up and mend the wings as best he could." A subtler form of pity, shading off into a luminous irony, runs through his depiction of such people as the Forsytes, the Carádocs, and the Pendyces. This kind of pity is so far above mere partisanship that it can embrace two opposed characters or social systems at once. It makes the feeling of the others toward De Levis in *Loyalties* seem snobbish yet difficult wholly to avoid. It nicely qualifies its approval of Courtier (in *The Patrician*) and its distaste for the rigidity of Miltoun. "Human nature has room for both and a good deal besides."

Galsworthy was intensely English: witness among a thousand passages, the feeling for one's own part of the land in "Devon for Me!" and in the final pages of *Over the River*. Therefore he was, usually, very reserved: witness his statement that he habitually creates "characters who have feelings that they cannot express." Yet the line in "Donkeys" where God's creation of these patient beasts is described as "One of the best of His numerous chores" is not, merely because its humor happens to be of the sort that we sometimes call American, any the less perfect as an expression, on one of its sides, of his extraordinarily well rounded nature.

The authenticity and significance of Galsworthy's people can perhaps be traced, in part, to the fact that they do not always seem wholly individual. In many of his sketches, especially, we meet them as type-studies, not yet ready to take a living part in novel or play. That some of Galsworthy's people seem not to have got quite far enough from this original state is perhaps their "doom." Yet he would probably reply—and perhaps rightly—that our significance, if we have any, arises to some extent from the fact that we are all less individual than we imagine ourselves to be. For he wrote of one of his characters: "When he met himself about the town (which hourly happened) he had no knowledge that it was himself; on the contrary he looked on himself as specially designed, finding most other people

'rather funny'." In the great gallery of his portraits, therefore, these studies of types and classes, though sometimes weighed down by their responsibility of representing so many besides themselves, do tend to document Galsworthy's best work, even if they are not quite a part of it. They show us how he labored to bring his best characters into a life the completeness of which requires some thought of their representative value as well as of their individuality.

It has often been pointed out that John Galsworthy, like his father before him, was himself a bit of a Forsyte. Obviously, or he could not so remarkably have done the Forsytes both from the outside and from within. But so are we all, all Forsytes, in our several ways. "As surely as a dog will bark at a brass band, so will the essential Soames in human nature ever rise up uneasily against the dissolution which hovers round the folds of ownership." By this fact of their universality, together with the equally certain fact that they are solidly planted, with their houses and their dogs and their flowers, as well as their prisons and their slums, in an England which a great writer loves yet wished to better, these books, at this short distance from them, seem extraordinarily well fitted to endure.

CHESTER N. GREENOUGH.

### KARL FRIEDRICH GELDNER (1852-1929)

Foreign Honorary Member in Class III, Section 2, 1925

Karl Friedrich Geldner was born December 17, 1852, at Saalfeld in Thüringen, and died February 5, 1929, at Marburg.

He began the study of Sanskrit and Avestan at Leipzig in 1871 with Brockhaus and Windisch. In 1872 he went to Tübingen, where the great Sanskritist Roth had such a deep influence on him that he remained there until he had completed his studies in 1875. He stayed in Tübingen until 1887, when he went to Halle.

Most of his early published works dealt with the Avesta. Between 1875 and 1895 he was much occupied with Avestan studies and with the preparation of a great critical edition of the Avesta. This is still the standard edition.

At Halle, where he was associated with Pischel, his interests turned more and more toward the Rig Veda. Between 1889 and 1901 he and

Pischel published three volumes of *Vedische Studien*, which subjected Roth's method of interpretation to severe criticism and gave a new direction to Vedic studies. The Rig Veda was not to be explained, as Roth had explained it, as a monument of Indo-Germanic antiquity, but as a work of Indian literature. It was to be explained from itself with the help of later Sanskrit literature and the native Indian tradition of Vedic commentators. It is significant, however, that continued study led him to place much less reliance on the native commentators than he did in the *Vedische Studien*.

In 1890 he went to Berlin as *aussserordentlicher* Professor, and in 1907 to Marburg as *Ordinarius*. He retired as *Emeritus* in 1921.

In 1908 he contributed to Bertholet's *Religionsgeschichtliches Lesebuch* two superb anthologies, *Vedismus und Brahmanismus* and *Die Zoroastrische Religion*.

His *Rigveda in Auswahl* (1907-1909) was a preliminary to his greatest work, a complete translation of the Rig Veda. The first volume of this was published in 1923; the second and third volumes, and the first volume in a revised form, are now in course of publication in the Harvard Oriental Series.

Geldner concentrated his life's work with undivided attention to the study of the earliest literary documents of Iran and India, the Avesta and the Rig Veda. From 1887 he turned with greater and greater enthusiasm to the Rig Veda, but regarded his edition of the Avesta as a duty which had to be fulfilled. Geldner was always a philologist. His aim was to edit, translate, and explain his texts by every means within his reach, but he did not extend his work to a wider general study of religious, philosophical, historical and cultural problems. As a philologist he concentrated on two great texts and allowed no smaller interests to interfere with his work on them. Of one he made the standard edition; of the other he made the most significant translation which has yet been produced.

WALTER E. CLARK.

FRANK AUSTIN GOOCH<sup>1</sup> (1852-1929)

Fellow in Class I, Section 3, 1879

In the references given can be found details in regard to the life and work of Professor Gooch. In the memoir by Professor VanName there are a number of interesting quotations from a story of his adventures at home and abroad written by Professor Gooch particularly for his two young grand-children.

Frank Austin Gooch was born in Watertown, Mass. on May 2, 1852, and died in New Haven August 12, 1929. At the age of sixteen he entered Harvard College and was awarded the degree of A.B. in 1872 with highest honors in physics and chemistry. He became an assistant to Professor Josiah Cooke, who inspired in him a keen interest in mineralogy. Several visits were made to Europe to study and work in this field. He returned to Harvard University, received his Ph.D. in 1877, and then went to Copenhagen to work with Julius Thomsen in thermochemistry. He returned to accept an opportunity to collaborate with Professor Wolcott Gibbs in the study of the complex inorganic acids. It was this work which determined his future career and led to his becoming a leader in the development of analytical chemistry. His informal autobiography contains this sentence in regard to the crucible known by his name—"It was during this period that I described in a paper a device which has proved to be of such general utility in analysis that, dubbed by the craft with my surname (usually reduced to the level of a common noun) it has found its way into the Standard Dictionary (of the English language) dragging me along with it."

In 1886 F. A. Gooch took up his work as Professor of Chemistry in Yale College. He reorganized the instruction, built a new laboratory, and developed a strong graduate school in chemistry. He was active in research, and solved many difficult problems in analytical chemistry. He introduced important new methods in the volumetric and electrochemical methods of analysis. He was elected to membership in many learned societies and won a permanent place in American Chemistry.

JAMES F. NORRIS.

<sup>1</sup> References: Biographical Memoir of Frank Austin Gooch 1852-1929. By Ralph G. VanName. National Academy of Sciences. Vol. XVI. American Contemporaries. By Philip E. Browning. Industrial and Engineering Chemistry XV, 1088 (1923). Obituary, American Journal of Science, 5th Series, 18, 539 (1929).

## MORRIS GRAY (1856-1931)

Fellow in Class III, Section 4, 1918

Morris Gray was born in Boston, March 7, 1856, the son of Francis H. and H. Regina (Shober) Gray. He was graduated from Harvard College in 1877 and from the Harvard Law School in 1880. In the same year he was admitted to the Bar in Massachusetts, and for the rest of his life was a practising lawyer in Boston. He died January 12, 1931.

As a lawyer Morris Gray displayed the orderly mind and care in regard to details which made him an ideal trustee and manager of large estates. But his associates in the Academy remember him rather as a man of letters, deeply interested in literature and the fine arts. It is significant that, although his first publication was "A Treatise on the Law of Communication by Telegraph," 1885, his later writings include "The City's Voice," a volume of poems published in 1923, "The Real Value of Art," an address delivered at the celebration of the fiftieth anniversary of the Metropolitan Museum of Art, and "The Museum and the Public," made up of selections from his annual reports as President of the Museum of Fine Arts. It is equally significant that the societies with which he was associated besides the American Academy of Arts and Sciences were the American Federation of Art, the Boston Society of Architects, the Boston Society of Arts and Crafts, the Numismatic and Antiquarian Society of Philadelphia, and the Authors' Club of London.

Morris Gray will be best remembered, perhaps, for his long and distinguished service to the Museum of Fine Arts. He was a Trustee of the Museum from 1902 until his death, and President of the Board from 1904 to 1924, a period marked by remarkable growth in the wealth of the Museum's collections and the enlargement of its building. It was during his administration that free concerts were first established at the Museum, and that all fees for admission were abolished.

To those who knew him best it was not so much the wide interests of Morris Gray as the quality of the man himself that made a special appeal. His kindness to younger men even when he was critical, and his consideration for the opinions of others even when they were contrary to his own were among his marked traits. He revealed himself most in his writing; everything he did, even the occasional speech,

was carefully thought out and scrupulously revised, and the result was often poetry in prose.

GEORGE H. CHASE.

### ADOLF VON HARNACK (1851-1930)

Foreign Honorary Member in Class III, Section 3, 1904

Carl Gustav Adolf von Harnack was born on May 7, 1851, at Dorpat, Esthonia, where his father, Theodosius Harnack, was professor of Theology. His education was at Dorpat and at Leipzig, and at the latter place he became head of the Department of the History of Christianity in 1876. He was Professor at Geissen in 1879, in Marburg from 1886 to 1889, and in Berlin from 1889 to 1924. In 1900 he was made Rector of the University of Berlin, and from 1909 to 1921 he was Director of the Royal Library. In 1914 Kaiser Wilhelm II elevated him to the hereditary nobility of Prussia and at the time of his death he was president of the Kaiser Wilhelm Society for the Advancement of Science, which he had founded. His death occurred in Heidelberg in June, 1930, at the age of 69 years.

It is interesting to note that he followed somewhat in the footsteps of his father and made Christian Theology and the History of Christian Thought his lifelong study. His books and pamphlets are legion—1700, it is said—and the Library of the British Museum has one hundred fifty-two separate titles. His most important work is his *Lehrbuch der Dogmengeschichte* in four volumes (1886-1890), which has passed through many editions and has been widely translated. He devoted his whole life to a continual study of historical and documentary sources of Christianity and is said to have detected many sayings of Christ not included in the New Testament but which have as good authority as those admitted to the canon of the New Testament. One of his ambitions was to reconcile Christianity and modern science. His researches into original sources and early expressions of dogma resulted in such new and vigorous reorganization of ideas of Christian dogma that the effects were felt in both conservative and liberal schools of religious thought. One of his basic theses was that the early Christian faith was positively affected by Greek philosophy and to such an extent that often Greek ideas rather than Christian doctrines found their way into the Christian faith and practices.

At the times when his books appeared severe criticism was aroused against him, and he was drawn into severe and wide controversies. One particular point which he always maintained was that students of Church doctrines should examine their history and substance, and that students of Theology should also maintain a mind open to all facts and new material. Perhaps equal in importance with his specific stands regarding the evolution of Christian dogma was his own attitude, one which he pressed upon his students, of an open mind toward all matters relating to Christian doctrine, dogma, and authority. His books and his pamphlets have circulated widely in this country and he has been considered a high authority in matters of Christian dogma and a fine ideal of honest free thinking.

LEE S. MCCOLLESTER.

#### OLIVER HEAVISIDE (1850-1925)

Foreign Honorary Member in Class I, Section 2, 1899

Oliver Heaviside, a genius in the field of mathematical physics, was born in London, England, on May 13, 1850. He was the nephew, on his mother's side, of Sir Charles Wheatstone, the eminent British telegraph engineer. One of his brothers—Arthur West Heaviside—was a superintending engineer in the British Post Office Telegraph Department, and a pioneer in radio telegraphy.

After leaving school, Heaviside entered the service of the Great Northern Telegraph Co. at Newcastle-on-Tyne. This company extended telegraph service by cables and land lines to Northern Europe and to the Orient. His interest thus became aroused in electric telegraphy to the study of which he devoted his spare time. By arduous home study, for he never attended college, he developed a remarkable mathematical talent for attacking the numerous unanswered problems of telegraph transmission. He was very shy and retiring by nature, and also suffered from deafness, so that, as time went on, he shunned society more and more. He preferred to live alone, first in London, and subsequently in Torquay, on the south Devonshire coast, living a hermit's life in penury rather than follow a vocation in practical life; because he could devote himself to his beloved applied mathematics. His articles on electrical subjects were communicated mainly to "The Electrician" of London, between 1885

and 1900, and to the "Philosophical Magazine" after 1900. These articles were far above the reach of most electrical engineers of that time. The editors often begged him to simplify his mathematics, but to Heaviside's mind they seemed to be already very simple.

In the course of his studies on the transmission of electric waves over wires, he was able to show that by theory the distributed inductance of telephone lines should be considerably increased. He also suggested inserting inductance coils in the line by experiment. His suggestions in this direction met with little encouragement. In later years, the successful use of inductive loads, inserted at regular distances in such lines, seems to have caused him much disappointment.

As a mathematician he was almost wholly self-educated. He invented methods of his own for dealing with particular problems in electro-physics. He firmly believed that mathematics should be treated as an experimental science, and judged according to its scientific results. For this originality, he suffered some censure at the hands of the classical mathematicians. It is only in recent years that Heaviside's operational calculus has been accepted as orthodox.

Heaviside's collected papers on electrical theory were published in 1892, and subsequent volumes up to 1912. By that time his fame as a mathematical physicist had become well established. He was elected F.R.S. in 1891, and received the Faraday Medal in 1921. He also received a Ph.D. degree from Göttingen University. In America, he was an honorary member of the American Academy of Arts and Sciences, and also of the American Institute of Electrical Engineers.

He contributed very notably to the theory of three-dimensional vectors, electromagnetic inertia, transient phenomena, and wave transmission.

In his later years, he lived entirely alone near Torquay. He had a small pension hardly sufficient for his subsistence, but he resisted the efforts of his friends to increase his income. Very few persons came into contact with him, although he had many scientific admirers. Sir William Preece, long the chief engineer of the British Post Office, used to speak of him as the "veiled prophet."

Heaviside died February 3, 1925, much honored, but personally almost unknown.

A. E. KENNELLY.

## WILLIAM COOLIDGE LANE (1859-1931)

Fellow in Class III, Section 4, 1907

William Coolidge Lane was born in Newton, Mass., July 29, 1859, the son of William H. and Caroline M. (Coolidge) Lane. With the exception of a brief interval, his entire active life after graduation from Harvard in 1881 was passed in various capacities in the Harvard College Library. From 1893 to 1898 he was Librarian of the Boston Athenaeum but was called back at the end of this period to become Librarian of the Harvard College Library as successor to Justin Winsor; he held this post for thirty years. Upon his retirement he was awarded an honorary A.M. by Harvard. A bibliography of Lane's writings is included in No. 21 of the *Harvard Library Notes* (August 1928) and a sketch of his life is given in his Fiftieth Anniversary Class Report.

Lane's interest in the technical side of library administration was always very keen and many of his contributions devoted to aspects of this field were printed in the *Library Journal*. At the same time he had strong literary and antiquarian interests. He was one of the leading pillars of the Dante Society throughout his life and was also a member of the Massachusetts Historical Society, the Colonial Society of Massachusetts, and an honorary member of the Literary and Historical Society of Quebec. He was likewise President of the Old Cambridge Shakespeare Association from 1910 to 1931. His penchant was more antiquarian than historical: he did much research into the history of Harvard College, was deeply interested in the Harvard Archives, and was the founder of the Harvard Memorial Society. Among the national organizations in which he was especially active were the American Bibliographical Society, of which he was President (1904-1909), and the American Library Association (President, 1898-1899).

He married Bertha Palmer in 1902 and is survived by his widow and two daughters, Miss Margaret Lane and Mrs. Milton E. Lord. He retired from the post of Librarian of the Harvard College Library on September 1, 1928, and died three years later of a heart ailment on March 18, 1931.

Quiet, unassuming and retiring, Lane carried out faithfully and intelligently a task of great importance in technically organizing the

Harvard College Library, which quadrupled itself during his term of office.

ROBERT P. BLAKE.

### HENRY ROSEMAN LANG (1853-1934)

Fellow in Class IV, Section 3, 1915

Henry Roseman Lang, who was elected a Fellow of the American Academy of Arts and Sciences in Class IV, Section 3, died on July 25, 1934, at New Haven, Connecticut. He was born at Wartau in the Canton of St. Gall, Switzerland, on September 22, 1853. In 1874 he graduated from the Gymnasium at Zurich and soon thereafter he began his career as a teacher in the United States. From 1878 to 1884 he was Professor of Modern Languages in the Peabody Normal College at Nashville, Tennessee. Thence he passed to other schools, but he interrupted ere long his labors as an instructor to prepare himself for the degree of Doctor of Philosophy, which he received at the University of Strasbourg in 1892. He returned immediately to the United States and entered at once into the Department of Romance Languages and Literatures at Yale University. There he was active for forty-two years, and he was the incumbent of the Barge Professorship of Romance Languages from 1896 to the date of his retirement in 1922. As Professor Emeritus from 1922 to the time of his death he continued in close touch with Yale University.

On August 29, 1901, Lang married Alice Hubbard Derby. Their happy union lasted until she passed away on July 19, 1928. Her memory will be kept alive at Yale by the Alice Derby Lang Memorial Prize which he established in her honor; by his will he has provided for further memorials for her at Yale and at Smith College.

In the classroom Professor Lang was noted for his accurate control of all the subjects with which he dealt, and he gained the abiding good will of his students. As a man of research and a productive scholar, he obtained world-wide recognition, particularly for his investigations in the fields of early Portuguese and early Spanish literature. There will long remain as monuments of learning his edition of the poems of King Denis of Portugal (*Liederbuch des Königs D. Denis*, 1894) and his edition of a very important collection of Gallician poems and songs (*Cancionero Gallego-Castelhano*, 1902). Outstanding among his

many contributions to Spanish philological research are his *Contributions to the Restoration of the Poema del Cid* (in *La Revue hispanique*) and the study which he prefaced to his reproduction of the *Cancionero de Baena* (1926). He was fearless in combating what he regarded as the erroneous doctrines of other scholars, but he was uniformly courteous in the manner in which he presented his arguments in rebuttal of theirs. Those who had the privilege of enjoying his personal friendship have reason to lament his passing, even though his span of life was a long one.

In Portugal his merits were acknowledged by his election as a Corresponding Member of the Portuguese Academy of Science and, while the land was still a kingdom, by the conferment upon him of a Knight Commandership in the Portuguese Order of Santiago; as was fitting, he was made a Corresponding Member of the Spanish Academy at Madrid.

J. D. M. FORD.

#### EDWIN RAY LANKESTER (1847-1929)

Foreign Honorary Member in Class II, Section 3, 1902

Sir E. Ray Lankester was one of the dominant figures of biology during the latter part of the nineteenth century. As physiology came to prevail over morphology in the twentieth century his influence was less felt.

Professor Lankester was born in London on May 15, 1847. He died on August 15, 1929.

His father was a well-known physician, a Fellow of the Royal Society, and for many years editor of the *Quarterly Journal of Microscopical Science*.

He was given a classical education at St. Paul's School in London, and entered Cambridge University at the age of seventeen. Two years later, attracted by the zoologist Rolleston, he transferred to Oxford, entering Christ Church College as a junior student. After graduating with first-class honors in natural science, as Radcliffe Travelling Fellow he studied marine zoology at the Naples Biological Station. On his return to England he taught successively at Oxford, London, and Edinburgh. In 1890 he succeeded Mosely as Linacre Professor of Comparative Anatomy at Oxford. In 1898 he became Director of the Natural History Departments of the British Museum

and Keeper of Zoology at South Kensington. In 1907 he retired at the age of sixty.

Lankester's scientific inclinations appear to have been influenced by his early surroundings. In his own home he met such men as Darwin and Huxley and heard them discuss the biological problems of the day. He began his published writing as a mere boy. His first paper was on the fossil *Pteraspis* and appeared in *The Geologist* in 1862. This led later to the important monograph on "The Cephalaspidæ" published in 1868-70.

In 1863 the *Quarterly Journal of Microscopical Science* published his first paper on the Gregarinidae. This was followed by numerous publications in the field of protozoology and parasitology. An early study (1864) of the anatomy of the earthworm led him to conclude that the earthworm is "the rock on which morphology is built." Comparative studies of invertebrates convinced him that annelids like vertebrates are coelomate, while the molluscs and arthropods have a different sort of body cavity which is filled with blood. In this way much light was thrown upon the racial history of animals. He demonstrated in his memoirs on *Limulus* that this animal is more closely related to the scorpions than to the crustacea.

His researches included the embryology of molluscs and of amphioxus. Many of the zoological articles in the *Encyclopedia Britannica* are his. He edited the well-known *Treatise on Zoology*. His popular writings are numerous. Among them are his books on "Comparative Longevity," "Degeneration," "The Advancement of Science," "The Kingdom of Man," "Science from an Easy Chair," "Great Things and Small." From 1878 to 1920 he was the editor of the *Quarterly Journal of Microscopical Science*, which under his direction became the leading British Journal in zoology.

He attained high reputation as a teacher. He was a man of commanding personal appearance, and his lectures aroused great interest through his infectious enthusiasm. His was the dominant influence which led to the establishment of the great Plymouth Laboratory.

Lankester was a Fellow of the Royal Society and of the Linnean Society. He was knighted when he retired from the British Museum. No man of his generation did more for the advancement of zoology as a science.

HERBERT V. NEAL.

## HENDRIK ANTOON LORENTZ (1853-1928)

Foreign Honorary Member in Class I, Section 2, 1912

Hendrik Antoon Lorentz, born at Arnheim, Holland, July 18, 1853, died February 4, 1928, was a very great physicist and unique among the physicists of our times by the very true and deep affection in which he was held by all who knew him.

Lorentz was graduated from the University of Leiden in 1875, where he became Professor of Mathematical Physics at the age of 25, a position which he held until within about ten years of his death, when he accepted the position of directing the research at the Teyler Institute at Haarlem, retaining however the position of Honorary Professor at Leiden, where he continued to lecture once each week. Lorentz received "all the distinctions to which a man of science is eligible"; he was a member of nearly all the learned societies of Europe and many of this country. He was made Nobel Laureate in 1902.

His doctor's dissertation was concerned with the reflection and refraction of light by the methods of the then new Maxwell theory, and in fact this treatise played an important part in introducing the concepts of Maxwell to continental physicists. In this treatise he extended Maxwell's ideas from static fields to the rapidly alternating fields of optical phenomena. The influence of Maxwell's theory remained strong throughout his life and gave a vivid directness to his physical imagery which was always striking. Perhaps the most characteristic of his contributions was his development of electron theory. The initial steps in this long development were taken soon after his doctor's dissertation, and involved an extension of the Maxwell equations to those regions forever inaccessible to experiment inside the electron, and also involved a deduction of the properties of large scale matter by a suitable process of averaging over all the small scale fluctuations of the field in the neighborhood of each electron. Courage and insight were needed for a program involving such arduous labors of detailed elaboration at a time when the Maxwell equations had not been unequivocally established even for large scale matter, and when the existence of the electron was not much more than a brilliant intuition to explain the fixed proportions of electrolysis. The reality of the electron substructure of the physical world rapidly became a matter of physical conviction through the many successes

of Lorentz's analysis; the most spectacular success in this field was his explanation of the splitting of spectrum lines in a magnetic field discovered by Zeeman. His development of electron theory perhaps reached its culmination in 1905 with the publication of his Columbia lectures under the title *The Theory of Electrons*, a work which for many years remained the standard treatise on this subject.

Hardly less important than electron theory were the results obtained by Lorentz from an extension of Maxwell's theory in another direction, to electromagnetic phenomena in moving bodies, a subject which Maxwell himself had not correctly treated. Lorentz succeeded in showing the necessity for the absence of all first order effects arising from the motion of an optical or electromagnetic system through an ether. The question of second and higher order terms, as in the Michelson-Morley experiment, proved more difficult, but Lorentz had by 1904 shown that the equations for any phenomenon in a uniformly moving system, when expressed in terms of certain transformed variables, are the same to terms of all orders as the equations in a stationary system expressed in terms of the quantities of ordinary measurement. It remained for Einstein to take the final step and give a different turn to the whole situation by postulating that the transformed quantities are the measured quantities in the moving system. Thus although Lorentz missed the final formulation of the theory of relativity, he came very close to it, and his transformation equations remain the basis of the whole theory and will always bear his name.

Electron theory and the theory of moving bodies are perhaps the two greatest creative results of Lorentz's genius. The later years of his life were spent partly in coordinating and expanding his own earlier results, and in various expansions of the newer physical theories. He retained in a highly unusual degree the power of quickly and sympathetically assimilating the new theories, which were often completely at variance with the concepts of his youth. I remember a lecture which he gave in Cambridge on the then new correspondence principle of Bohr which impressed me greatly by the freshness of his grasp and the illuminating power of his point of view. But the last years of his life will be more remembered for his lectures, which he delivered in every civilized country of the world, and for his masterly presiding at scientific meetings. With regard to this phase of his work

I cannot do better than quote from the understanding appreciation written by W. H. Bragg in *Nature* at the time of his death:

"For many years Lorentz naturally and by general consent took the leading place in every European conference of physicists. He had won the affection and respect of men of all countries. He could use several languages fluently and accurately. He could grasp quickly the meaning of a speaker and immediately on the termination of an address he could repeat its arguments and conclusions in such other languages as might be desirable, so that all present were kept in touch with one another. He never allowed a discussion to stray.

Nevertheless, even his great abilities and his sound judgment would not alone have made Lorentz the perfect president that he was. His success was due also to a wonderful and most attractive courtliness, to a humour that could express itself in not one language alone, and not least to the charm of a kindly and affectionate disposition. He was really beloved by all who sat under him. In his own field, and that no insignificant one, he was one of the forces that drew together men of different nations and brought them to a mutual understanding."

P. W. BRIDGMAN.

#### DAVID GORDON LYON (1852-1935)

Fellow in Class IV, Section 3, 1887

David Gordon Lyon, the son of Dr. Isaac Lyon and Sarah Caroline Arnold Lyon, was born in Benton, Alabama, on the 24th of May 1852, and died in Boston, after a brief illness, on the 4th of December 1935. In 1884 he married Tosca Woehler of Leipzig, who passed away in 1904. Six years later he married Mabel E. Harris, who died in 1931; their son, David Gordon Jr., survives him.

Lyon was graduated A.B. from Howard College (Alabama) in 1875 and then entered the Southern Baptist Theological Seminary, where his instructor in Hebrew was Crawford H. Toy. He continued his studies in Hebrew and began his work in Assyrian at the University of Leipzig, where he received his Ph.D. degree in 1882. His doctoral thesis, published in 1883 under the title *Keilschrifttexte Sargons* as Volume 5 of the *Assyriologische Bibliothek*, contains the cuneiform text, a translation, and a commentary on the inscriptions of Sargon, King of Assyria.

At the suggestion of Professor Toy, who had been appointed Hancock Professor of Hebrew and Other Oriental Languages and had founded the Department of Semitic Languages at Harvard in 1880, Lyon was appointed Hollis Professor of Divinity in 1882, and began to teach courses in Hebrew, Assyrian, and other Semitic languages. Upon the retirement of Professor Toy in 1910, Lyon was transferred to the Hancock Professorship, and served as the chairman of the Division of Semitic Languages and History until he retired in 1922.

As early as 1887 Lyon had obtained some funds for the purchase of Babylonian tablets. Three years later, with a sum provided by Jacob H. Schiff, he purchased in various parts of Europe the first collections for the new Harvard Semitic Museum, of which he was appointed Curator in January 1891, and of which he remained in charge for forty years. From Mr. Schiff, Lyon also obtained funds for the erection of the Semitic Museum building, formally opened in February 1903, and substantial contributions for its maintenance.

During 1906-07 Lyon was in Palestine as Director of the American School for Oriental Research in Jerusalem. He returned there in 1908 when he directed, with Dr. Gottlieb Schumacher, the Harvard excavations at Samaria, continued during the two following years under the direction of Dr. George A. Reisner. In coöperation with the Fogg Art Museum, Professor Lyon organized in 1927 the Harvard-Baghdad School Expedition to Nuzi, near Kirkuk (Iraq), that carried on archaeological excavations during four seasons.

A scholar of exacting standards and uncompromising thoroughness, Professor Lyon wrote sparingly but well. His work includes, besides the inscriptions of Sargon (1883), an Assyrian Manual (1886; 2d edition 1892), studies on the Hammurabi Code (1904 and 1912), reports on the Harvard excavations at Samaria and at Nuzi and, with Drs. George A. Reisner and Clarence S. Fisher, two important volumes on the Harvard Excavations at Samaria (1924). With Professor George F. Moore he edited the *Studies in the History of Religions* presented to Professor Toy in 1912, and for twenty-two years (1912-1934) he was one of the editors of the Harvard Semitic Series.

Professor Lyon was a Fellow of the American Academy of Arts and Sciences, and a member of the American Oriental Society, of the Society of Biblical Literature, and of the Archaeological Institute of America.

A true Southern gentleman in aspect and character, dignified in bearing, kindly in spirit, deeply religious, Professor Lyon commanded the respect of his acquaintances and the affection of his intimates.

ROBERT H. PFEIFFER.<sup>1</sup>

#### ARTHUR ANTHONY MACDONELL (1854-1930)

Foreign Honorary Member in Class III, Section 2, 1919

Arthur Anthony Macdonell died December 28, 1930, four years after his retirement from the Boden Professorship of Sanskrit in the University of Oxford, which he had held from 1899.

His parents both came from the north of Scotland. His father went to India in 1841 as an Ensign in the 40th Bengal Native Infantry, rose to the rank of Colonel, and died at Mussoorie in 1870. Macdonell was born May 14, 1854, at Muzaffarpur in Tirhut (North Bihar). During the Indian Mutiny he was saved from death by the fidelity of an Indian servant. For some unknown reason he was sent for education to Germany, at first to a school at Dresden and then to the Göttingen Gymnasium (1870-75).

He began the study of Sanskrit and Comparative Philology under Theodor Benfey at the University of Göttingen; then entered Corpus Christi College at Oxford in 1876, where he continued his Sanskrit studies under Monier Williams. After taking his degree he pursued his study of Vedic literature under Max Müller and then took the Degree of Ph.D. at Leipzig with a thesis relating to the *Sarvāṇukramanī* of the Rig Veda, and with Comparative Philology and German as accessory subjects.

He was Lecturer in German (1880), Lecturer in Sanskrit (1884), Deputy Professor of Sanskrit (1888), and Boden Professor of Sanskrit at Oxford after the death of Monier Williams in 1899. Much of his time was devoted to the development of the Indian Institute, of which he was Keeper, and to the collection of books, periodicals, and manuscripts.

He devoted himself chiefly to the study of the Veda, the earliest literature of India, and dealt with this from the point of view of Comparative Philology and the early history of religions, although

<sup>1</sup> Abridged from a minute prepared with the coöperation of G. H. Chase and W. Thomson.

he was not a specialist in linguistics nor a profound student of religion and philosophy as such.

He was not a theorist, was not interested in broad and superficial generalizations, and did not propose new and ingenious speculations. Trained in critical and historical methods, his shrewd common sense, "industry and love of a definite outcome led to the production of substantial and accurate treatises," for "he was never captivated by the glitter of new and startling theories."

His *Vedic Mythology* (1897) is the most useful summary of that subject; his *Vedic Grammar* (1910) is the most comprehensive. The two volumes of his *Vedic Index of Names and Subjects* (1912), written with the help of A. B. Keith as collaborator, is the most generally known and the most useful of his works. His *Vedic Reader for Students* (1917), accompanied by the *Vedic Grammar for Students* (1916), gives an excellent selection of hymns from the Rig Veda for beginners. His *History of Sanskrit Literature* (1900) is the best known of his smaller works. *India's Past* (1927) is an excellent compendium of the literatures, languages, religions and antiquities of India.

*Camping Voyages on German Rivers* (1890) and *Camping Out* (1892) bear witness to his robust physical vigour and ardent love for the out-of-doors.

He made two voyages to India; the first in 1907, as the result of which he acquired a Library of about 7,000 manuscripts, the second in 1922-23, undertaken in order to deliver a course of lectures on Comparative Religion at the University of Calcutta.

WALTER E. CLARK.

#### ALFRED PERCIVAL MAUDSLAY (1850-1931)

Foreign Honorary Member in Class III, Section 2, 1914

Alfred Percival Maudslay was born on March 18, 1850 at Tunbridge Wells, England, the son of Henry Maudslay of Woolwich, a famous engineer and inventor, "one of England's finest craftsmen." He died on January 22, 1931 at his beautiful estate, Morney Cross, Fownhope, near Hereford, on a slope above the Wye commanding a view of Hereford Cathedral and in the distance the Black Mountains of Wales.

His education began at Harrow in 1863 and continued at Trinity Hall, Cambridge, from which he was graduated in 1872, when he

gained a second class in the Natural Sciences Tripos. At school he tells us he was called "a barren tree" and "an arid desert." The untruth of these statements was soon shown.

Immediately after graduation, with a "great desire to see a tropical forest," he set sail with his brother for the West Indies. He visited Panama and traveled through a part of Guatemala.

His early life was filled with administrative positions in the English colonies, first at Trinidad and later in Queensland, Fiji, Tonga, and Samoa. His success as a colonial administrator was great. His kindly and sympathetic nature made him an ideal type to treat with the natives, and his name came near ranking very high in the history of the Pacific when he completed negotiations with the Samoan chiefs for the unreserved cession of Samoa to Great Britain. Unfortunately, a previous agreement between his country and Germany prevented any advantage being taken of his understanding with the Samoans.

His fame, however, which might well have rested on colonial administration, came from his archaeological investigations in Central America. His trip in 1881 was the first of seven undertaken from 1881 to 1894. He conducted these elaborate expeditions entirely at his own expense, together with photographing and casting. He writes:

"I was at a loss to know how best to make use of my notes and collections, when Mr. Godman kindly offered to relieve me of all the expense of printing and the reproduction of plates, and to publish my work as an addition to the '*Biologia Centrali-Americana*,' if I would supply all necessary photographs, drawings and plans, and a written memoir."

From this happy arrangement we have the four monumental volumes of plates and four of text covering Maudslay's archaeological work. These volumes have never been equalled in the excellence of the plates, the accuracy of the plans, and the detailed studies of the architecture and the carefulness of the drawings of the hieroglyphic inscriptions, done under Maudslay's direction by Miss Annie Hunter.

It is needless here to enumerate the ruins he visited, several of which he made known to the scientific world for the first time. His plans, drawings, and photographs of Palenque, Quirigua, Chichen Itza, and many of the lesser sites have never been superseded. Coming down the Usumacinta River, he was the first archaeologist to reach the ruins of Menche (Yaxchilan), anticipating by a day or two the arrival of Charnay, who came up the river.

In 1891, through the initiative and aid of the late Charles P. Bowditch, another great patron and scholar of Maya research, the Peabody Museum of Harvard University had a ten year concession with Honduras to explore at Copan.

In 1893-94, owing to the death of Mr. Owens, one of the archaeologists, no one was sent to the site by the museum, and Mr. Maudslay kindly consented to serve as its representative. In previous visits he had already examined the site, giving letters to the stelae discovered by him. While there in 1893-94, he completed the moulds of the inscriptions omitted from his earlier series and moulded others found by the museum.

Early in his studies of the Maya ruins, Mr. Maudslay was impressed with the great importance of the hieroglyphic inscriptions. He took special pains to photograph and mould, wherever possible, the hieroglyphs. From these Miss Annie Hunter made the famous drawings of the inscriptions which have been a boon to all students of this subject. As early as 1886 he recognized the formula of the beginning of many of the inscriptions. Part 2 (vol. 1) of the *Biologia* appeared in 1890, and on plate 31 he has a famous drawing, placing side by side the first glyphs of several inscriptions. These he names the "Initial Series" for the first time, and notes the difference between the inscriptions with numbers and those without, noting that the number in the first glyph is almost invariably nine. It is indeed probable that it was Maudslay who suggested to Goodman the possibility of the face numerals which Goodman later worked out. Maudslay also recognized the rosette form for twenty, and the double number on the Uinal glyph of what, later, was called the Secondary Series.

The list of his honors is a long one. In addition to being Honorary Fellow of Trinity Hall, he received the Hon. Sc.D. from Cambridge, and the Hon. D.Sc. from Oxford in 1912, in which year he was the President of the Royal Anthropological Institute and the Chairman of the Organizing Committee and President of the International Congress of Americanists in London. He joined the Royal Geographical Society in 1884, and was Honorary Secretary for several years. He was also a member of the Council of the Hakluyt Society. An Honorary Professorship in the Museo Nacional at Mexico City was something of which he was always proud. He also held Honorary memberships in the Société des Américanistes of Paris,

the American Antiquarian Society, the American Academy of Arts and Sciences, and the American Anthropological Association, and was a corresponding member of the Berliner Gesellschaft für Anthropologie. In 1926 he received the Rivers Memorial Medal of the Royal Anthropological Institute.

He bequeathed his valuable Mexican manuscripts, books, pamphlets, and a very extensive collection of ancient maps to the British Museum, and his Fijian collection to the Cambridge University Museum. The invaluable Gouverneur Morris papers which he inherited from his wife were left to the Library of Congress, Washington.

Mr. Maudslay's aim was perfection, and his published scientific works show that his ideal was accomplished. As a scholar, he refused to be satisfied with hazy generalizations, and sought the truth. His gentle nature, his retiring disposition, and his great modesty were outstanding characteristics. He was without guile. One can often wonder as to his reactions to the modern scientific expeditions with their aeroplanes and motors, their staff of secretaries, moving picture operators, and, most necessary of all, publicity agents. His own splendid accomplishments were unheralded in the press, and were generally unrecognized except by a few faithful friends and fellow archaeologists until toward the last twenty years of his life. Mr. Maudslay's work can never be equaled. During the last forty years, time and man have worked havoc with the Maya ruins. Priceless records have now disappeared, but many of them are permanently recorded in the monumental volumes of the *Biologia Centrali-Americana*. And Maudslay's schoolmates at Harrow called him "a barren tree"!

ALFRED M. TOZZER.

#### GEORG ELIAS MÜLLER (1850-1934)

Foreign Honorary Member in Class IV, Section 1, 1933

Georg Elias Müller died in Göttingen on December 23, 1934, at the age of eighty-four, after a long life of distinguished service to experimental psychology. He was born in Grimma, Saxony, on July 20, 1850. He attended the University at Göttingen, and there he received in 1873, on the recommendation of R. H. Lotze, the doctor's degree in philosophy. He was habilitated as *Dozent* at Göttingen in 1876. After a year at Czernowitz, he succeeded Lotze at Göttingen in 1881, and he held this chair for forty years until his retirement in 1921.

Müller was one of the pioneers in the new experimental psychology. Wundt, eighteen years his senior, may be said to have got the new science 'founded' at Leipzig, but the chief support for it came presently from Müller at Göttingen, Stumpf at Berlin, and a few others, like Ebbinghaus and the physiologist, Hering. The contribution of Müller to psychology was distinguished by its diversity and thoroughness. In two fields, psychophysics and the experimental study of memory, Müller became the leading investigator and he dominated scientific progress for a time in these subjects by the extent and originality of his researches. In a third field, the psychophysiology of vision, he ranked for many years next to Helmholtz and Hering.

Müller took over the problems of psychophysics from Fechner. In 1878 he criticized and revised Fechner's methods, laying a more solid foundation for the technique of sensory measurement as it is practised today. Before the close of the century he had contributed notably to an understanding of the psychological mechanisms underlying successive comparison, and in 1904 he published his second critique of the psychophysical methods. These two monographs of Müller's stand out, with Fechner's writings, as the classical literature in the field of general psychophysics, a field which has been extensively developed in modern psychology.

Although it was Ebbinghaus who in 1885 initiated the experimental technique for the measurement of memory and learning, it was Müller who, during the next quarter of a century, developed the procedures and laid the foundation for our systematic knowledge of to-day. It was Müller who showed that the strength of an association determines the speed of the memory reaction as well as the correctness of the response. It was Müller who first discovered and described retroactive inhibition, the weakening of memory by mental work undertaken after learning. And there are many other classical problems in this field that go back to Müller for their inception.

Müller's contributions to the psychophysiology of vision began in articles that were published in 1896 and ended only with papers that have reached publication after his death. In this field he is best known for his theoretical insight, especially for his synthesis of Hering's and von Kries' theories and for his realization that the facts of color mixture require a cerebral as well as a retinal explanation.

For four decades Müller remained one of the world's chief experi-

mental psychologists. His work and his writing were at all times characterized by a care and critical insight which has scarcely been surpassed among contemporary psychologists. He saw concrete facts always in relation to the larger systematic and theoretical structure of the new science. His research belongs to the period when the entire range of scientific psychology could lie within the purview of a single scholar, and psychology is not likely soon again to have a scholar who combines precision with breadth so successfully as did Müller.

EDWIN G. BORING.

### SAMUEL PARSONS MULLIKEN (1864-1934)

Fellow in Class I, Section 3, 1912

Professor Samuel Parsons Mulliken<sup>1</sup> was a distinguished chemist, a fine character, and a great personality. Internationally known for his work on organic qualitative analysis in which field he was easily preëminent, he was also an inspiration to students of organic chemistry at the Massachusetts Institute of Technology and a model for them of the painstaking scientist unwilling to make his judgement until the evidence was complete.

The earliest recollections which I have of Professor Mulliken date from the time when I was a second-year student, spending my afternoons in the laboratory of analytical chemistry. He used frequently to walk through the long room carrying small glass capsules which he was accustomed to leave on the steam plate until their contents had been evaporated to dryness, for he was at that time working, as I later learned, on the second volume of his treatise on "The Identification of Pure Organic Compounds." The glass capsules were of a sort which were new to me, their contents looked interesting; and it seemed that the tall and scholarly appearing man who carried them so carefully, so intent about his business, must be a chemist of great erudition and manipulative skill. The next year, when I took his course in organic chemistry, I found the impression completely verified. The

<sup>1</sup> The present notice is rewritten from an article, "Samuel Parsons Mulliken," in the American Contemporaries Series, *Ind. Eng. Chem., News Edition*, 12, 197-198 (1934). An obituary by Avery A. Ashdown, with a portrait, was printed in the January, 1935, number of *The Nucleus*, published by the North-eastern Section of the American Chemical Society.

lectures were illustrated with unsurpassed experiments. Samples of all of the substances under discussion were circulated through the class. I learned to distinguish the odor of benzaldehyde from that of nitrobenzene. And I recall a beaker containing an aqueous solution of nitrobenzene, accompanied by a second beaker containing strips of sterilized filter paper which we dipped into the solution and tasted—and learned that the taste was sweet. Professor Mulliken was ready at all times to take the trouble to be clear. He seemed pleased that the students were mastering the intricacies of the subject, and the students learned the better for the sake of pleasing him.

Samuel Parsons Mulliken was born in Newburyport, Massachusetts, on December 19, 1864, a descendant of the earliest white settlers of the Plymouth and Massachusetts Bay Colonies. Among his ancestors were Mullikens who were watch and clock makers and captains of clipper ships. He was named after his great-great-uncle Samuel Holden Parsons, a major-general in Washington's army and a member of the board which court-martialed Major André. While teaching at Technology he continued to live in Newburyport, and traveled back and forth to Boston by train. Taking into account the fact that he made the same trip daily while a student and that he came to the laboratory each day during a large part of the summer, a conservative calculation shows that he traveled more than a million miles on the Boston and Maine Railroad, more than four times the distance to the moon, or about six light-seconds. He did not seem to weary of the railroad, for one day in January, 1934, during the mid-year period, when traffic in Boston and Cambridge was paralyzed by heavy snow, he took a "snow train" for New Hampshire and went to Mt. Washington for a day of skiing.

His interest in chemistry, like that of Michael Faraday and many another, was first aroused by Mrs. Marcet's "Conversations on Chemistry." He once told me that he used to read the book while a small boy, lying on the dining-room floor. Two future chemists attended the Newburyport High School together, Mulliken from the south end of town and Arthur A. Noyes from the north end. At school they studied Steele's "Fourteen Weeks in Chemistry," and they studied the book outside of school. They secured a copy of Eliot and Storer's "Manual of Inorganic Chemistry," and experimented in their home laboratories, Wednesday afternoons in Noyes'

laboratory in the attic of his father's house and Saturday afternoons in Mulliken's on the second floor of the woodshed. They used blotting paper for filtering, for the books called for "bibulous paper" and insurance advertising blotters were available without cost. One day, for some reason, they experimented in the dining room of the Noyes' home, where the large table provided a convenient workbench. A dictionary was used to support a portion of the apparatus. The experiment was the production of phosphoretted hydrogen by the action of caustic alkali on yellow phosphorus. The flask broke, and the effects upon the book, the table, and the rug were such that the boys thereafter experimented in the dining room no more. They did not confine themselves to chemistry, for they secured a copy of Hill's "Rhetoric" and studied it. Perhaps they had need of rhetoric to persuade their parents to allow them to continue their experimentation.

After he had completed his high-school course, Mulliken worked for two years in an apothecary shop at Newburyport, where he compounded prescriptions and found time to read Faraday's "Chemical Manipulation" and to carry on many of the processes which are described in that book. When he entered the Massachusetts Institute of Technology in the autumn of 1883, he was excused from the requirements in freshman chemistry. He received the bachelor of science degree in chemistry in 1887, after having performed the experimentation for his thesis under the direction of Lewis M. Norton. Under this man's cousin, Thomas H. Norton, he spent the academic year 1887-88 at the University of Cincinnati, where he gave experimental lectures and taught chemistry of all kinds.

In the summer of 1888 four Technology graduates went to Europe together in pursuit of advanced study. There were three chemists, Mulliken, Noyes, and Augustus H. Gill, and a student of music on his way to Munich, Frederic Field Bullard, author of the "Stein Song." When the boat reached Antwerp, the chemists found awaiting them a letter from Baeyer which informed them that all available places in the laboratory at Munich were already occupied. They decided to "shop around" among the German universities. They visited Heidelberg which seemed dead, and Bonn where they met Anschutz who showed them the beer gardens and introduced them to Kekulé who expressed an admiration for Americans—and they selected Leipzig as the place to continue their study. Here they were joined by Henry

P. Talbot, another Technology chemist. Mulliken worked with Wislicenus on the isomerism of the  $\alpha$ - and  $\beta$ -chlorocinnamic acids. The relations between configuration and acid strength did not prove to be as predicted, and quantitative data were secured by measurements of the ionization constants in Ostwald's new laboratory of physical chemistry. While at Leipzig, Mulliken also took advantage of the opportunity to listen to Wundt's lectures on psychology and on the history of philosophy. The four Americans received their Ph.D. degrees from Leipzig in 1890, and a few years later were together again as members of the chemistry department of the Massachusetts Institute of Technology.

Mulliken spent the academic year 1890-91 as fellow in chemistry at the newly founded Clark University, and carried out researches on the electrolysis of malonic, acetoacetic, and orthoformic esters. He was associate in chemistry at Bryn Mawr for one year, 1891-92, and returned to Clark as instructor and acting head of the chemistry department for two years, 1892-94, until that department was discontinued for a time. During the next year he worked for a while in the private laboratory of Wolcott Gibbs at Newport, Rhode Island. From 1895 until the time of his death he was a member of the chemistry department of the Massachusetts Institute of Technology, teaching organic chemistry, a full professor after 1926. During the war he served as Major in the Chemical Warfare Service, U. S. Army, where his duties required him to act as immediate assistant to the chief of that service in many scientific matters.

Mulliken's principal interest was in the identification of pure organic substances, in their physical and chemical peculiarities, and he accumulated a vast fund of information on many special branches of organic chemistry. In addition to teaching general organic chemistry, he directed a number of Doctor's researches and gave courses on dye-stuffs, on heterocyclic compounds, and on organic qualitative analysis. The latter course gave a fine chance for graduate students to learn the manipulation of small quantities of material. The "Laboratory Experiments on the Class Reactions and Identification of Organic Substances," by Noyes and Mulliken, which was first published in 1897, was used for many years in connection with the third year organic laboratory course. Students were required to identify several unknowns and the components of two or three mixtures.

Mulliken's large work, "A Method for the Identification of Pure Organic Compounds by a Systematic Analytical Procedure Based on Physical Properties and Chemical Reactions," in four volumes, is a product of enormous industry and care. He spent more than eight years in the preparation of the first volume. The first three volumes list more than 10,000 compounds in their tables; the fourth volume deals with dyestuffs. The preface of the first volume says—"Very few compounds that could be purchased in the open market have been omitted except through oversight. . . . The claims for admission to this volume of every compound of carbon with hydrogen, or with hydrogen and oxygen, that receives mention in the second edition of Beilstein's great 'Handbuch der Organischen Chemie' and its supplements issued prior to January, 1902, have been separately passed upon, and about 2300 selected as deserving mention in the tables. All copied data used in the manuscript sent to the publisher have been twice compared with their source by the author and once by Dr. Heyward Scudder." More important even than the comparison with the literature is the author's assurance that many hundreds of the tests have been tried in his own laboratory. They were "performed at least several times in accordance with the directions contained in the manuscript" and had proved successful in the hands of two or more persons.

During most of his life Professor Mulliken spent the large part of the summers in his laboratory. Such recreation as he had he took out of doors. Toward the latter part of his life he occasionally spent as much as two months out of the summer at a cottage at Pemaquid, or more commonly took one or more two-weeks cruises along the beautiful rocky coast of Maine. Starting from Pemaquid in a 30-foot motor boat, usually in the company of one or more of the younger members of the organic chemistry staff of the Massachusetts Institute of Technology, he would cruise as far west as Portland and as far east as Mt. Desert and Bangor. He would sleep on board and would show as much facility in meeting the exigencies of the knockabout life of the small boat as he did in the manipulation of the most perverse of organic substances. In the spring of 1932 at the end of the school year, he organized among the organic chemists an all-day fishing trip to Ipswich Bay. It was so successful that the next spring a second boat was hired and the physical and inorganic chemists went along.

Professor Mulliken was a quiet man, reserved, almost shy. He spoke only after reflection and always took the kinder and more generous of alternative points of view. He was intensely devoted to his family, though he talked but little about his personal affairs and nonprofessional interests. He enjoyed his membership in the Tuesday Evening Club of Newburyport.

Professor Mulliken would have been seventy years old in December, 1934, and was planning to retire from active teaching in the spring of 1935. In the early summer of 1934 he was seized with an attack of rheumatic fever which compelled him to rest quietly for several months in the hospital at Newburyport, where he nevertheless indulged in correspondence and found pleasure in conversation with the friends who visited him. Convalescence appeared to be advancing satisfactorily; he was removed to his home but died there on the 24th of October.

TENNEY L. DAVIS.

CARL HANSEN OSTENFELD<sup>1</sup> (1873-1931)

Foreign Honorary Member in Class II, Section 2, 1928

Ostenfeld was born Aug. 3, 1873, at Randers in Jutland, where his father was established as a physician. He was educated at the University of Copenhagen, studying botany under Warming. He received his doctorate in 1906. Already, in 1900, he had been appointed to a post in the Botanical Museum at Copenhagen. This he held until 1918, when he became professor of systematic botany at the Agricultural College of Denmark. In 1923 he returned to the Museum as director. He died at Copenhagen, Jan. 16, 1931.

Such is the brief outline of a career devoted to the advancement of botanical science in Danish institutions, but by no means of a local cast. He travelled much in Europe. He made two voyages, in 1895 and in 1910, for the study of marine plankton, a subject in which he never lost interest and which he pursued at intervals nearly throughout his life. A paper on the plankton of Danish waters won him the Prix Desmazières in 1917.

During his first voyage he touched at some of the high northern

<sup>1</sup> Taken from a notice by Carl Christensen in *Berichte Deutsch. Bot. Gesellschaft*, 49, 1931, 164-168.

islands; then began an interest in the plants of the Arctic which also was life-long. He projected a "Flora Arctica" and published one part of it, covering the pteridophytes and monocotyledons, in 1902. This effort convinced him that the data available were not yet ample enough for a really satisfactory flora; largely for that reason, he never published further, though his work on the subject never ceased and toward the end of his life he had begun to plan for a continuance of publication. At home, he organized a thorough-going study of the "topographic botany" of Denmark—the detailed distribution of all the species occurring there. With the cooperation of many Danish botanists, professional and amateur, work toward this end was carried on for twenty years. Publication of the results began in the year of Ostenfeld's death.

In genetics also, particularly as related to taxonomy, he showed both interest and ability. His early studies did much to establish the now well-known fact that the taxonomically complicated genera *Taraxacum* and *Hieracium* are, with the exception of a comparatively small group of species in the latter, capable of apogamic reproduction and generally dependent upon it.

Ostenfeld was a man of distinguished appearance and of kindly and attractive manner. He was a hard worker of the sort who never appear to hurry and yet whose product is surprisingly large. He lived to make himself the first authority on the flora of the North; that his comparatively early death prevented his putting his accumulated knowledge at the service of his successors is a misfortune often recurrent in a subject whose progress is likely to be too slow for the limits of human life.

C. A. WEATHERBY.

#### WILLIAM PATTEN (1861–1932)

Fellow in Class II, Section 3, 1921

William Patten was born at Watertown, Mass., March 15, 1861, and died at Hanover, N. H., Oct. 27, 1932.

A boy's interest in ornithology and anatomy, already acquired before he entered Lawrence Scientific School, ripened into a life purpose while he studied there under Professors Mark and Shaler. An essay on "Myology and Osteology of the Cat" written during his

freshman year won him the Walker prize of the Boston Society of Natural History; and his skill as an illustrator and taxidermist helped his way through college. Though a hard worker he found time for baseball, college glee club and choir.

Awarded a Parker Traveling Fellowship when he graduated in 1883, Patten studied at the University of Leipzig under the zoologist Leuckart, and received his doctorate at the end of the year. Research followed: one year at Trieste and one at Naples. Returning to America in 1886, he was assistant for three years at the Allis Lake Laboratory at Milwaukee and then became Professor of Biology at the University of North Dakota.

In 1893 he was called to Dartmouth College by President William Jewett Tucker, where his vigorous personality and skill as an investigator at once stimulated interest in Zoology and laboratory methods. His writings at first dealt with the embryology of molluscs and arthropods, especially *Limulus*; but soon focussed more definitely on the nervous systems and phylogeny of ostracoderms, scorpions and primitive fishes. Out of these studies came Patten's theory of origin of the vertebrates.

With a paleontologist's enthusiasm he closed his workshop each summer to travel far afield in search of new material; and collected an amazing array of fossils from New Brunswick, Newfoundland, Labrador, Costa Rica, Cuba, New Guinea, Australia, Java, Japan, the Baltic region and Spitzbergen. Patiently and with fine technique he worked alone over these treasures, freeing fossils one by one from their muddy matrix and exposing to view delicate details of form and structure not previously known. More and more surely he came to believe that ostracoderms were the ancestors of fishes, linking invertebrates to vertebrates. This thesis, to which he devoted his energy and talents with even greater concentration while fellow scientists dissented with it, became the ruling passion of his scientific career. He spent little time in conference or argument with other experts in his field, preferring to get inspiration and guidance directly from Nature's record. While giving more of his time to solitary research than to attendance at meetings, Patten was a lecturer who invariably compelled attention through the force of his personality and the courage of his convictions, whether he was addressing a small group of obedient advanced students, a sympathetic popular audience or an assembly

of skeptical colleagues. His presentation was always stimulating and provocative.

When in 1920, near the close of his service to the College, he was called upon to organize and direct a required course for freshmen in Evolution, he devoted his still abundant energy to the new task. So for a decade or more every student entering Dartmouth felt the impact of a man of science whose independent and skillful manipulation of the tools of laboratory and field bore fruit in a social philosophy whose keynote was "Co-operation."

Retiring from this over-strenuous service at the age of 70, Patten continued to collect and study Baltic fossils with undiminished eagerness; but his strength had failed and he succumbed to a heart attack after only a week's illness. He was survived for a year by his wife, Elizabeth Merrill Patten, who ever since his graduation in 1883 had been his constant companion, even on collecting expeditions to the corners of the earth. Their only son, Bradley Merrill Patten, born in Milwaukee in 1889, is now Professor of Histology and Embryology at the University of Michigan.

J. W. GOLDTHWAIT.

#### WILLIAM HENRY PERKIN, JR. (1860-1929)

Foreign Honorary Member in Class I, Section 3, 1919

William Henry Perkin, Jr. was one of the great organic chemists of the structural tradition. He was the son of the chemist who prepared the first coal-tar dyestuff, and grew up in an atmosphere of scientific research and technical development. He entered the Royal College of Chemistry in 1877 where he studied under Edward Frankland and W. R. E. Hodgkinson. In 1880 he went to Würzburg where he studied chemistry with Wislicenus, physics with Kohlrausch, and mineralogy with Sandberger, and received the Ph.D. degree in 1882. In the autumn of 1882 he went to Munich to work with Baeyer—and became Privatdozent at the University, remaining until 1886. In 1887 Perkin became the first Professor of Chemistry at the newly founded Heriot-Watt College at Edinburgh. He left Edinburgh in 1892 and assumed the duties of Professor of Organic Chemistry at the Owens College, Manchester, succeeding Schorlemmer, where he remained for 21 years. From 1913 to the end of his life he was Pro-

fessor of Chemistry in the University of Oxford, which he made one of the foremost centers of chemical research in England. His studies were devoted mainly to the development of the possibilities of synthesis and to the elucidation of the constitution of various organic substances which occur in nature.

An obituary notice, published as a special number of the *Journal of the Chemical Society*, London, 1932, contains a biography of Perkin by John Greenaway which describes his family life, his method of work, his love of music, etc., and is illustrated with three portraits and a picture of the Oxford commemorative medallion. It also contains an account of his work, in two sections, the first by Jocelyn F. Thorpe on his early work, the formation of carbon rings, the chemistry of camphor, the chemistry of the terpenes, and miscellaneous research, and the second by Robert Robinson on his work on the constitution of berberine, braziline and haematoxyline, harmine and harmaline, cryptopine and protopine, etc. A list of his original memoirs includes 271 titles of papers which were published during his lifetime and four more of papers which were posthumous.

TENNEY L. DAVIS.

#### ODIN ROBERTS (1867-1934)

Associate, 1928; Fellow in Class III, Section 1, 1932

Odin Roberts was born in Boston, January 22, 1867. He was educated in the public schools and at Chauncy-Hall School, and entered Harvard College at the age of fifteen. Graduating in 1886, he entered the Massachusetts Institute of Technology and received a degree there in 1888, and then studied law in the Harvard Law School, taking his bachelor's degree in 1891. All this was in preparation for the practice of patent law with his father, a distinguished patent lawyer. He practised patent law all his life with great success. He was also a very enthusiastic graduate of his University, one of the founders and president of the Harvard Club of Boston. He died July 23, 1934.

The chief quality of Roberts was his enthusiasm; and this quality filled with human interest a life that was devoted to a rather narrow profession. At a time when most men thought a Harvard club in Boston could never be successful he pushed it through by the very

force of his enthusiastic friendships. His service to learning lies only in his devotedness to his profession for which he was prepared as well by a mechanical as by a legal education. His wide intelligence, however, gave him a deep interest in and appreciation of scholarship which was one of his most pleasant characteristics.

JOSEPH H. BEALE.

### EDWIN ARLINGTON ROBINSON (1869-1935)

Fellow in Class IV, Section 4, 1927

The poet Edwin Arlington Robinson, son of Edward and Mary (Palmer) Robinson, was born at the village of Head Tide, Maine, on December 22, 1869. His childhood and youth were passed in the nearby city of Gardiner where after his first year his family lived in comfortable circumstances, and this was the only home he ever knew. He was educated in the schools of Gardiner and later spent the years 1891-1893 in Harvard College.

Critics of Robinson's work have seen in it, I think rightly, the clear mark of this early environment. He was and never ceased to be a Yankee, a Maine man, a Gardiner boy; and his friends know how much of Gardiner is in his Tilbury Town, how much of the common traits of his Gardiner neighbors in Isaac and Archibald, in Mr. Flood, in Richard Cory and in many of his other characters; how much of himself in Aunt Imogen.

The character of inflexible integrity, the principles and the preferences that were formed in Gardiner in the last third of the nineteenth century remained singularly unchanged throughout the first third of the twentieth. Thus, in much of his writing he was a regional poet whose life and work might well be analyzed by the method of Taine. Nevertheless, during the twentieth century he lived far from Gardiner, in New York, in Boston, and during many summers at Peterboro in the McDowell Colony where he found a way of living most happily suited to his needs, his habits and his taste.

While still a schoolboy Robinson turned to poetry. He has himself said,<sup>1</sup> "It was about my seventeenth year when I became violently excited over the structure and music of English blank verse" and this

<sup>1</sup> This and the following quotations are from Robinson's article, "The first Seven Years," published in the *Colophon*, Part IV, 1930.

led to the singular experiment of a metrical translation of Cicero's first oration against Cataline. From his sixteenth year onward he wrote "innumerable short poems and sonnets." This early work was momentous in several respects. First, it was both absorbing and steadily, if on the whole involuntarily, persevering; as he says "There were such things as hours and days and weeks on clocks and calendars, but it made no difference to me how few or many of them went to my getting a few lines to go as I wanted them to go." Secondly, his early work was, as I have implied, consciously experimental—both metrically and verbally. He became "an incorrigible fisher of words." He wanted "the fish that were smooth and shining and subtle, and very much alive, and not too strange." And he also sought and found new tones. Thirdly, some of this was apprentice work done under the direction of a master. Robinson's master was a Gardiner physician, Dr. A. T. Schumann, of whom he has said "I am sure that he was one of the most remarkable metrical technicians that ever lived." To Schumann he felt and acknowledged a debt that he could not "even estimate." Though this debt was probably for technical instruction and professional formation alone, yet thereby Robinson's poetry was from the beginning distinguished from the poetry of the self-taught by firmness of touch and by consciousness of means no less than of ends. This is the fortunate result of an extraordinary chance.

One outcome of his early work is described by Robinson as follows: "It must have been about the year 1889 when I realized finally, and not without a justifiable uncertainty as to how the thing was to be done, that I was doomed, or elected, or sentenced for life, to the writing of poetry. There was nothing else that interested me. . . ." Another result was the discovery of his own poetic idiom. He speaks of awareness of his early short poems and sonnets, "not being quite like anything else—or anything that I remembered."

Of a little later period he says, "I was still confident that the poems had nothing worse than a new idiom to condemn them," and then goes on to illustrate his idiom with the monosyllabic beginning of his sonnet "The Clerks,"—

"I did not think that I should find them there  
When I came back again; . . . . ."

This idiom, thus discovered and formed under such favorable condi-

tions, is the unmistakable mark of his work throughout his life. Long unrecognized by the public, the critics and other poets, it seems to belong to the second decade of the present century, when it began to be widely recognized, felt and accepted, and thus became one of the most important factors in the development of recent American poetry. It is perhaps not often possible to discover so clearly a literary origin. That origin is in Gardiner about the year 1890.

Robinson's career from 1897 onward belongs to the history of American literature and this is not the place to discuss it. It is, of course, a period of growth accompanied by some development of his idiom, by the broadening of his scope, by the perfecting of his poetic skill. But meanwhile his single-hearted devotion to poetry, his conscientious craftsmanship, and his sense of professional responsibility never varied and he was always incapable of any other real work than the writing of poetry.

During the first two decades of his active life the new tones of the music of English verse that as a youth he had seized and made a part of himself were not heard or, though heard, were generally not recognized by the public. Thereafter almost suddenly they became familiar and are now at length a part of the common store of our auditory memory.

Robinson was the author of the following works:

- The Torrent and the Night Before (1896)
- The Children of the Night (1897, 1905)
- Captain Craig (1902)
- The Town Down the River (1910)
- Van Zorn (play, 1914)
- The Porcupine (play, 1915)
- The Man Against the Sky (1916)
- Merlin (1917)
- Lancelot (1920)
- The Three Taverns (1920)
- Avon's Harvest (1921)
- Collected Poems (1921)
- Roman Bartholow (1923)
- The Man Who Died Twice (1924)
- Dionysius in Doubt (1925)
- Tristram (1927)
- Collected Poems (5 vols.) 1927
- Sonnets (1928)

Cavender's House (1929)  
The Glory of the Nightingales (1930)  
Matthias at the Door (1931)  
Nicodemus (1932)  
Talifer (1933)  
King Jasper (1935)

He received the honorary degree of Doctor of Letters from Yale in 1922 and from Bowdoin in 1925. He was thrice awarded the Pulitzer prize for poetry; in 1921 for the *Collected Poems*, in 1924 for *The Man Who Died Twice*, and in 1927 for *Tristram*. He was a member of the National Academy of Arts and Letters, of the National Institute of Arts and Letters, and in 1929 was awarded the Institute's gold medal.

Robinson died in New York City on April 6, 1935, having lived sixty-five years and three months.

L. J. HENDERSON.

#### GEORGE BYRON ROORBACH (1878-1934)

Fellow in Class III, Section 3, 1932

Professor George Byron Roorbach was born in Herkimer County, New York, on December 8, 1878. He died in Washington, D. C., on May 23, 1934.

He received his academic degree at Colgate College in 1903; in 1926 his alma mater conferred on him the honorary degree of Doctor of Science. His graduate study was carried on in Harvard University and the University of Pennsylvania, where he received the Master's Degree in 1912. His teaching experience was rich and varied. He held successively the post of high school principal (De Ruyter, New York, 1903-05); of science master (Peddie School, Hightstown, New Jersey, 1905-1908); of instructor and assistant professor of geography (University of Pennsylvania, 1909-19); of professor of foreign trade (Harvard Graduate School of Business Administration from 1919 until his death).

His interest and efforts in the subjects he taught, however, were not confined to the classroom. They naturally overflowed into the field of public service on the one side and writing on the other. He was fortunate in receiving and being able to respond to many calls which developed his contact with the realities involved in his academic

work. In 1915 he made a special investigation of financial conditions in Venezuela for the Carnegie Endowment. In 1918-19 he was special expert for the United Shipping Board. It was during this service that he so favorably impressed former Dean Gay that he was offered the Professorship in Foreign Trade at Harvard. After coming to Harvard his work was repeatedly punctuated rather than interrupted by calls to government service. In 1921 he served the United States Tariff Commission. During the following year he was chief of the research division of the United States Department of Commerce. In 1926-27 he carried on an extensive special investigation of trade in the Far East for the Bureau of International Research of Harvard University. His death came at a moment when he was once more called upon by the nation to give it the benefit of his advice, this time in the capacity of special adviser on foreign trade for the Department of State. His numerous contributions to the periodical literature of foreign trade bear clearly the stamp of classroom discussion, though the metal out of which they were cast is just as clearly dug from business. His major works include *Import Purchasing*, 1927; *International Competition in Trade of India*, 1931; *Problems in Foreign Trade*, 1933.

Professor Roorbach was opposed to the isolationist or defeatist attitude on foreign trade that has been common since the world war. He believed that in the long run a liberal foreign trade policy would not only be justified under conditions of restored international society, but that it would materially hasten that consummation. He saw the difficulties and was particularly troubled by some of the current manifestations of fevered nationalism. But he never lost faith in the essential brotherhood of man. In fact, the only thing that seems ever to have roused the ire of this mild-mannered scholar was the sweeping condemnation of foreigners that according to him too often took the place of facts, reasoning and decent sentiment in discussions of the subject of which he was master, foreign trade. He was elected to fellowship in the American Academy of Arts and Sciences in 1932.

NATHAN ISAACS.

## ERWIN FRINK SMITH (1854-1927)

Fellow in Class II, Section 2, 1914

When man hath looked deep into Nature's heart,  
From dwarfing selfishness hath purged his own,  
And upright, free and happy, shall be thrown  
A god among the gods to play his part.

ERWIN F. SMITH, July 4, 1910.

Dr. Erwin F. Smith was born at Gilbert's Mills, N. Y., on January 21st, 1854. He died at his home in Washington, D. C., on April 6th, 1927. Short accounts of his life and work have appeared in *The Official Record*, U. S. Department of Agriculture, of April 20th, in *Science*, of October 28th, and in *Phytopathology*, of October, all in the year 1927. After graduation from the Ionia, Michigan, High School in 1880, he received his B.S. degree from Michigan University when he was thirty-two years old. He was thus late in graduating because he had to earn his way through these schools by teaching. In 1889 he received his Sc.D. degree from the latter institution.

During his teaching and student years in Michigan, he became acquainted with two men who had much to do with directing his future career in botany. These were Charles F. Wheeler and Volney M. Spalding. In their memory he makes this abbreviated statement in his text book on "Bacterial Diseases of Plants":—"The first showed me how to study flowering plants, open my eyes to the wonders of wood and field and was my companion in a thousand delightful rambles. From him I had also my first lessons in French. The second taught me how to study the parasitic fungus and where to find its literature, often reading it with me when it was in foreign tongues." He later was intimate with these men in the U. S. Department of Agriculture at Washington and elsewhere until their death.

In 1886 Smith went to Washington and there became associated with Galloway and his early assistants in developing the "Division of Vegetable Pathology," as it was then known. The writer first met him in 1893 when he was in charge of a Government exhibit at the World's Fair and last saw him when he was honored by the American Phytopathological Society at their annual dinner in Philadelphia on December 29th, 1926. These thirty-three years cover the time of Smith's most valuable and numerous publications.

As I write this article in the Library-Herbarium room here at the

Experiment Station at New Haven, I sit facing, on the wall, an enlarged photograph across the bottom of which is written in pencil *Erwin F. Smith*. This photograph, showing him in profile view, evidently was made at about the same time as that published in *Phytopathology* and is of a man past his prime in life but still vigorous and alert. His beard, cut in Van Dyke fashion, is quite white but his hair shows only an occasional grey thread. The lines at the corners of the eyes and the general aspect give the impression that here was a genial man as well as one of power. However, this picture bears little resemblance to the young, black-bearded man shown under the name of Smith (E. F.) in plate VIII of Smith's paper, "Fifty Years of Plant Pathology," published after his death in 1929, in the Proceedings of the International Congress of Plant Sciences at Ithaca. I like it even better than the picture, as a frontispiece to that article, which shows him in his laboratory coat and with a rather questioning look on his face.

There is no doubt that Dr. Smith was admired by his immediate associates at Washington as well as by his fellow botanists elsewhere. Not only was he a man who was very considerate to the many persons who came casually to his laboratory but he was decidedly helpful to those who stayed there for a longer time. The women scientists of the United States also owe him a debt of gratitude since he was one of the first to open his laboratory to them both as assistants and visitors. He recognized their ability as fine technicians in certain lines of botanical work. For this he has been repaid by their loyalty to him when hired as assistants.

Not only was this man a trained and well read botanist, who developed a fine personal library that he used in his leisure hours, but he became a great technician in his special line of bacteriology as well as an expert photographer. If Thaxter is to be ranked as our leading pen-and-ink mycological artist then Smith deserves to be considered as the leader for photographic pathology. Many of his articles contain half-tones of plant diseases while several of them use almost as much space as his written comments. Those who knew him best state that he was artistically inclined in other ways. He also had no small ability as a poet, having published a volume of his verses and certain translations. Altogether he was not only a fine botanist, great in his own line of plant bacteriology, but he was unusual in these other

respects. It is, however, on what he discovered and what he wrote in a botanical way that his claim to fame must rest. He was honored by election to the presidency of various botanical societies as well as receiving other scientific preferments. Refusing chances for financial improvement elsewhere, he was content to remain with the laboratory he had established in the Department.

Dr. Smith began his botanical writings in 1881 and from 1886 until his death published, with few exceptions, one or more articles of this nature each year. Dr. R. H. True, in the *Phytopathology* article already mentioned, has given a very complete list of these papers, numbering two hundred and forty-three. Classifying all these writings rather vaguely, as is done here, we find that over one hundred deal with bacteria in some phase, about thirty with fungi, fourteen with virus troubles, twenty-four with flowering plants or their physiology, twenty-five with miscellaneous topics, thirty-five with reviews and translations and nine with biographies.

As with most of the older botanists, Dr. Smith's first publication was on the flowering plants. This was written with Charles F. Wheeler who was apparently the senior author. After Dr. Smith went to the U. S. Department of Agriculture in 1886, his writings for several years dealt with a variety of subjects, such as short articles on parasitic fungi and their control, reviewing articles on fungi by other authors, etc. Most of these were written for the *Journal of Mycology*, then published by the U. S. Department of Agriculture, under Galloway as Chief, with Smith as one of his assistants.

Soon, however, he became interested in a little understood disease known as Peach Yellows, a preliminary bulletin on which was published by the Department in 1888. It was his studies of Peach Yellows and related virus diseases, during the several years following, that would have made a name for Smith even if he had not become famous from his studies of bacterial diseases. His most important results with these virus diseases were the showing of their transmission by budding. His efforts with various fertilizers as cures, etc., were not so successful. He apparently came to believe that these troubles were caused by ultra-microscopic organisms. His work was too early to show, as did Kunkel later, that a species of leaf-hopper was the carrier of the disease. No one yet, however, has shown the real cause of such diseases.

While Smith in his early writings published some short articles and abstracts on fungi, he cannot be considered the leader in this line of work. Two of his largest and best publications are "Wilt Diseases of Cotton, Watermelon and Cowpea," and "Dry Rot of Potatoes due to *Fusarium oxysporum*," both U. S. bulletins.

It is as an investigator of bacteria, as the cause of plant diseases, that Erwin F. Smith made his reputation. While Burrill may be called the discoverer of bacteria as the cause of plant diseases, Smith should be known as the one who placed this phase of Bacteriology on a firm, safe basis. This is assured by his numerous articles on a great variety of bacterial diseases, too numerous to be mentioned here, as well as by his victory over Fischer in the noted discussion as to whether bacteria were the primary cause of certain diseases of plants. The final evidence is shown in his three-volume work, of nearly one thousand pages, entitled "Bacteria in Relation to Plant Diseases," as well as by his text-book, of nearly seven hundred pages, called "Bacterial Diseases of Plants," both copiously illustrated with drawings and photographs.

G. P. CLINTON.

### WILLIAM EDWARD STORY (1850-1930)

Fellow in Class I, Section 1, 1876

William E. Story was born in Boston on April 29, 1850, the son of Isaac and Elizabeth Story. He did distinguished and important work in several of the most recondite departments of pure mathematics, and was one of the pioneers in the establishment of high standards of mathematical research and mathematical education in the universities of this country. He graduated as A.B. at Harvard University in 1871, and was Parker Fellow there in 1874-75; from 1871 to 1875, he pursued mathematical studies at the Universities of Berlin and Leipzig, receiving the degree of Ph.D. at Leipzig in 1875; in 1875-76 he was Tutor in Mathematics at Harvard. Upon the opening of Johns Hopkins University in 1876, Story was appointed Associate (and shortly after Assistant Professor and Associate Professor) in Mathematics. In this capacity, he was the chief representative at Johns Hopkins of the methods and ideals of modern higher mathematics as cultivated in the universities of Continental Europe; for

Sylvester, though a great mathematical genius, and a most inspiring personality, was quite unfamiliar with the mighty advances that were being made by the mathematicians of Germany, France and Italy.

It was at Johns Hopkins that the first impulse was given to any systematic development of mathematical research in this country; and when Clark University was opened in 1889, its President, Stanley Hall, invited Story to be the head of its mathematical department, with a view to carrying out, in an even more intensive way, the purposes which animated the mathematical faculty at Johns Hopkins. How faithfully and enthusiastically Story devoted himself to this task may be seen from the Report on the first ten years of the Department of Mathematics in the Decennial Celebration volume issued by Clark University in 1899—a Report which, though written by Story, gives more generous space to the researches of the Assistant Professor, Henry Taber, than to his own. How extensive and varied, as well as profound, were Story's researches, may be seen from a glance at the titles of his numerous papers; the mention of a few of them must here suffice:

On the Theory of Rational Derivation on a Cubic Curve (*Amer. Jour. of Math.*, 1880)

On the Non-Euclidean Geometry (*Ibid.*, 1882)

A New Method in Analytic Geometry (*Ibid.*, 1887)

On the Covariants of a System of Quantics (*Mathematische Annalen*, 1893)

New General Theory of Errors (*Proc. Amer. Acad. of Arts and Sci.*, 1904)

Partial Pressures in Liquid Mixtures (*Philos. Magazine*, 1910).

Mention of the last-named paper is a reminder that Story, though chiefly interested in the problems of pure mathematics, was also interested in its application to physics. He also took a deep interest in the history of mathematics; and it may be added that he had a somewhat unusual penchant for puzzles which are interesting from a mathematical point of view.

As regards the training of students of the higher mathematics, and the bearing of that training upon the advancement of other sciences, Story states his views in the Clark Decennial volume, in a most vigorous and effective way; we see that, but for the want of means, what he would have built up at Clark University would have been

just such an institution as is now being developed at the Institute for Advanced Study at Princeton, with Einstein as head of the department of mathematics.

Story was editor in charge of the American Journal of Mathematics from 1878 to 1882, editor of the Mathematical Review, and a member of the National Academy of Sciences. He was head of the Department of Mathematics at Clark University from its foundation until he retired as Emeritus Professor in 1921. He was happy in his marriage as in his work; his wife, whom he married in 1878, was Miss Mary D. Harrison of Baltimore. She and their only child, William E. Story, Jr., survive him. He died of pneumonia, after a very brief illness, April 10, 1930, having fulfilled, throughout a long life, the ideals of a devoted teacher and a single-minded lover of scientific truth and progress.

FABIAN FRANKLIN.

### HENRY PAUL TALBOT (1864-1927)

Fellow in Class I, Section 3, 1899

Henry Paul Talbot was born in Boston, May 15, 1864, son of Zephaniah and Eliza Frances (Paul) Talbot. The family tradition has it that the Talbots were originally French, but came to England with William the Conqueror. At all events, they were among the earliest to settle in Massachusetts. Chief Justice Cushing, a friend of George Washington, and Commodore Silas Talbot are among the distinguished ancestors. Henry Talbot's father was in the United States Navy for many years, but resigned and became an industrialist, locating in Holliston, Massachusetts, where he owned a blanket mill and a tack factory. The mother was of Scottish parentage.

Henry Talbot grew up in Holliston and Boston. He graduated from the Holliston High School in 1881, and in September of that year he entered the Massachusetts Institute of Technology with which Institution he was identified throughout the remainder of his life. He graduated from the course in Chemistry with the degree of S.B. in 1885, and was immediately taken upon the staff where he served as assistant and instructor for three years. The following two years were devoted to study at Leipzig where he obtained the degree of Ph.D. *summa cum laude* in 1890. He majored in Organic Chemistry under Wislicenus, and he took courses under Ostwald in the then new field

of Physical Chemistry. Returning to Technology he passed through the grades of Instructor 1890-1892, Assistant Professor 1892-1895, Associate Professor 1895-1898, Professor of Analytical Chemistry 1898-1902, Professor of Inorganic Chemistry and in charge of the Department of Chemistry and Chemical Engineering 1902-1920, in charge of the Department of Chemistry 1920-1922, Dean of Students 1923 until his death. In addition to the duties of the above mentioned offices he served as Chairman of the Faculty 1919-1921, and from 1920-1923 as Chairman of the Administrative Committee which conducted the affairs of the Institute following the death of Dr. Maclaurin until the appointment of Dr. Stratton.

Dr. Talbot received an honorary Sc.D. from Dartmouth in 1921. During the war he served as a member of the Advisory Board of the United States Bureau of Mines, Department of Gas Defense. In 1891 he married Frances E. Dukehart of Baltimore. They had a son in 1893 who lived only two years.

Dr. Talbot's great ideals were the advancement of education and of chemistry. He advanced those ideals through his work as an educator and administrator at the Institute of Technology, and by his services in many professional organizations, among which were the American Chemical Society, the Society for the Promotion of Engineering Education, the New England Association of Chemistry Teachers, the American Academy of Arts and Sciences. He was always an active leader in these organizations, in which he served, often repeatedly, in the capacities of President, Director and Chairman of Committees. He helped greatly to make of these societies active agencies for advancing the interests of Education and Chemistry.

It is not strange that, with his great devotion to these activities, his energy hardly sufficed for much personal activity in scientific research. His great contribution to productive scholarship was in enabling and encouraging his students and members of his staff to carry out researches. He appreciated fully the importance of research, but in his mind education preceded research, and he encouraged the members of the instructing staff of his department to do research work only to the extent that it would increase their capacity to teach. His work in life was to develop men to be chemists, teachers, industrial leaders, leaders in the development of pure science, and administrators. He himself did not attempt to do much to further the expansion of

science, his function was to impart to others a love and understanding of science.

Dr. Talbot was thorough and conscientious to a fault, never sparing himself, and always following personally every detail in carrying on the work of his department. He always took a profound interest in the personalities of his students and members of his staff, and it was this personal interest as well as his great ability as a teacher which must be largely responsible for the careers of many of today's leaders in chemistry.

Dr. Talbot's great interest in the personalities of students quite naturally led him to the office of Dean of Students when he decided to retire from active teaching, and from 1923 to 1927 the students of Technology had a friend who would give them strong support through difficulties and discouragements, and encouragement when they were successfully progressing.

In Dr. Talbot's comparatively early death, June 18, 1927, the Massachusetts Institute of Technology, and the educational and scientific interests of New England, indeed of the whole country, lost a worker and a friend upon whom they had long relied for sound advice, helpful coöperation and leadership.

ARTHUR A. BLANCHARD.

### EDWARD WYLLYS TAYLOR<sup>1</sup> (1866-1932)

Fellow in Class II, Section 4, 1924

Born in Montclair, N. J., May 7, 1866, the son of Alfred and Jane Brown Tucker Taylor, he attended public schools and entered Harvard College in 1884. During his four undergraduate years he made many friends, particularly a number of men who later practised medicine in Boston. He made philosophy his major subject, received honorable mention as a student, and wrote a dissertation for his commencement in 1888. He entered the Harvard Medical School the next year and obtained the Boylston Medical Society prize in February, 1891, with an essay entitled, "The Mental Element in the Treatment of Disease," published the same year.

After his graduation he went back to his home and then left for

<sup>1</sup> Condensed from *Archives of Neurology and Psychiatry*, Nov. 1932, Vol. 28, pp. 1182-1187.

study in Europe spending the time from October, 1891, until September, 1893, in Germany, at Berlin and Freiburg. He became a student of Prof. Hermann Oppenheim in Berlin and showed so much promise that he was appointed assistant in Oppenheim's department, serving there one year. During this period he was largely concerned with the anatomy and pathology of the nervous system. There were at that time few laboratories devoted to neuropathology, either in this country or in Europe. It was, therefore, a rare opportunity to study under the leading clinical neurologist in Europe.

In the autumn of 1893, he began the practice of neurology in Boston and soon became associated with the Harvard Medical School. As the result of his work with Oppenheim, he had become interested in the pathology of the nervous system, and his first connection with the school was in this department, under Prof. W. T. Councilman. On his first visit to Councilman, he showed him some very large and beautiful slides of the brain which he had cut and stained in Oppenheim's clinic. Such slides had never been seen here before and did much to recommend Taylor for the school position he sought. A small laboratory was, therefore, established as adjunct to general pathology with Taylor in charge of the very moderate amount of teaching which was considered sufficient for that day. The importance of neuropathology was recognized, however, by J. J. Putnam and W. N. Bullard and soon after a separate department was created.

In 1906, Taylor officially began his career as teacher of neurology as assistant to Professor Putnam, succeeding him in 1912, and continuing as the James Jackson Putnam professor of neurology until 1926, when with the regrets of all he resigned on his sixtieth birthday to become professor emeritus. It was as a teacher of clinical neurology that Taylor undoubtedly made his greatest reputation. With the individual student he was sympathetic and stimulating, with a small group he was lucid in his discussion, but before a large class his presentation was at its best. Such a clinic was seldom prepared in advance. He carried no notes. He often did not know about the patient to be presented, but by a few rapid, well-worded questions he obtained the essential symptoms and, with this as a start, he then developed with skill the clinical picture. His talk would be filled with reference to similar and contrasting conditions and illustrated with diagrams on the blackboard, always drawn by him during the lecture.

Although giving full credit to others, he disliked the pedantic method, and so omitted references, long words, dates, figures and complicated prepared diagrams in his effort to simplify his exposition. In this manner he brought neurology before the student as a vivid, intelligible subject, understandable even to the least interested of the class. It is not without reason that he was considered by many a student as the best clinical lecturer in the school. His clearness and simplicity also appealed to many graduate students in his successive years as "the chief" at the Massachusetts General Hospital.

Taylor established many connections with hospitals in cities near Boston. One of his particular interests was the Long Island Hospital, a city institution for chronic disease in Boston Harbor. Here he did his earliest pathologic work after returning from Berlin. Up to the time of his death, he served as secretary of the Board of Visiting Physicians. In his earlier days he did much of his teaching at this institution, and some of his best papers result from long clinical observation of chronic cases with correlated necropsy reports. His interests were also broadened by membership on the Massachusetts State Board of Insanity, and later as consultant at the Riggs Foundation in Stockbridge, in both of which capacities he served for a number of years.

From the time of his graduation from college he was always interested in the literary side of medicine. He served on the staff of the Boston Medical and Surgical Journal as assistant editor (1899-1912) and finally as editor (1912-1914, inclusive). Other activities included positions on the editorial board of the Archives of Neurology and Psychiatry, the Journal of Nervous and Mental Diseases, and the New England Quarterly. For many years he edited the Collected Reprints, department of neurology, Harvard Medical School.

His medical contributions consisted of nearly one hundred papers, many of them, before publication, being read before local or national societies. Particular interest was shown along two lines of thought: multiple sclerosis, which occupied his attention from the time of his earliest medical work in Oppenheim's clinic up to the latter years of his life, and psychotherapy, which was always prominent in his mind.

Outside of his medical work, Taylor had many interests. He wrote a number of papers on witchcraft, especially the medical aspect of the problem. In his later years he became a devotee of chess, and

established an informal club in Boston which met frequently in his house. On the grounds of his summer home at Ipswich he built a small stone building, known as the "chess house," ingeniously devised in the shape of a chess "castle" where he could play a quiet game surrounded by pine trees which he himself had planted many years before. He particularly enjoyed the quiet friendship of medical colleagues and others, and for many years he was a member of a small medical dinner club. He was a popular member of his class in Harvard College, and often spoke at the reunion dinners. On Oct. 14, 1897, he married Elsie Brewster Howe, in New York. She and two daughters survive him. His death occurred on August 17, 1932.

Such in brief outline is the medical life of Taylor—a persistent worker, almost exclusively in his chosen field of neurology. Much good original work stands under his name, but without doubt his greatest contribution was of a personal kind. He was one of a rare group who know not the meaning of jealousy; on the contrary, generosity and honesty were his outstanding characteristics, endearing his associates to their chief in a manner not often attained. His was never the hand of the taskmaster. Though his love of his profession was great, his life was conspicuously balanced, for his participation in games and sports and his interest in even the trivial affairs of his friends were vital to him. Even-tempered, optimistic, alert, often humorous, these are some of the characteristics which come to mind when we think of Wyllys Taylor, not as a doctor, but as a friend.

JAMES B. AYER.

HENRY R. VIETS.

### HENRY WEEDEN UNDERWOOD, JR.<sup>1</sup> (1895–1934)

Fellow in Class I, Section 3, 1933

Henry Weeden Underwood, Jr. was a Fellow of the Academy for less than a year, but during that time he was a regular attendant at its meetings and derived much pleasure from them. Quiet and unobtrusive in all that he did, he was more than usually shy and sensitive, quick to respond to friendship, with a huge capacity for

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<sup>1</sup> An obituary notice by Avery A. Ashdown, with a portrait, was printed in the April, 1934, number of *The Nucleus*, published by the Northeastern Section of the American Chemical Society.

work and for the enjoyment of his scientific interests. He was for many years a member of the American Chemical Society; later he joined the History of Science Society, and in recent years the French, German, and Dutch Chemical Societies. The journals which he received, his teaching which he planned with a meticulous attention to detail, his research, his writing, the daily newspapers of which he read regularly a considerable number, his devotion to the principles of the Episcopal church and his mystical satisfaction in its ceremonies, an occasional fishing trip with one colleague or a day in the woods with another, a constant readiness to find pleasure in the things which gave pleasure to his closest friends—these things made up his life. To those who had not yet penetrated his reserve or seen behind his diffidence, his quiet and regular comings and goings must have seemed to constitute a humdrum, dull, routine existence. But he was a man rich in inner resources. His classical education, superimposed upon his Yankee heritage, had given him a fine sense of values, a pleasurable appreciation of excellence—a profound satisfaction in a job well done whether his own or another's. He was beginning to enjoy life and to lead it productively.

Professor Underwood was born in Wakefield, Rhode Island, on August 14, 1895. He attended the grammar school at Narragansett and graduated from the South Kingston High School in 1912. The whole of his formal higher education was acquired at Brown University where he was awarded the degrees of Bachelor of Philosophy in 1916, of Master of Science in 1917, and of Doctor of Philosophy in 1919. He carried out the research for the doctorate under the direction of Professor John E. Bucher, and remained at Brown University for one year longer as a Research Fellow. In 1920 he joined the Chemistry Department of the Massachusetts Institute of Technology as instructor of organic chemistry, a position which he occupied until his appointment as Assistant Professor in 1929. In 1930 he was commissioned Captain in the Specialist Reserve, United States Army, and from that time taught the chemistry of explosives to the group of Ordnance officers of the regular army which was sent each year to the Massachusetts Institute of Technology. He died on March 20, 1934. He had nursed his father who was ill with pneumonia, and was with him at the time of his death. He caught the disease himself and died three days later.

He was the author of two textbooks, "Problems in Organic Chemistry," McGraw-Hill Book Company, Inc., 1st edition, 1926, and "Experiments in Organic Chemistry," John Wiley & Sons, Inc., 3d edition by Moore and Underwood, 1927, both of which have been widely used in American colleges. The first of these proved of great value to graduate students who were studying for the doctor's examination, and is likely for some time to continue to be used for the same purpose. His researches, published for the most part in the *Journal of the American Chemical Society*, included studies on catalysis and on the effect of catalytic agents on the mechanism of reactions, studies on the decomposition of esters, studies in the diphenic acid series, and studies on the phthaleins tending to throw light upon the relations between color and chemical constitution.

TENNEY L. DAVIS.

#### IGNATZ URBAN<sup>1</sup> (1848-1931)

Foreign Honorary Member in Class II, Section 2, 1914

So far, at least, as his biographers tell us, Ignatz Urban never went outside of Germany; yet he probably added more than any other one man to our understanding of the flora of the West Indies. The herbarium botanist is sometimes ridiculed; and, indeed, the ideal condition is found when the same investigator works competently in both field and study. But scarcely less is achieved when able collectors like Sintenis, von Türckheim, and Ekman can turn over their material to a closet taxonomist of Urban's learning, energy, skill, and judgment, with the resources of a great botanical institution at his command. Indeed, with him, this collaboration may well have achieved more than could have been accomplished in any other way.

Urban was born January 7, 1848, at Warburg. His father was a prosperous brewer. The son was educated at the Universities of Bonn and Berlin. At first he studied philology, but soon turned to botany. He was a pupil of Alexander Braun, Karl Koch, Ascherson, and Kny. He served in the Franco-Prussian war, returning safely to take his doctorate in 1873 with a morphological and biological study of the genus *Medicago* as his thesis, and to assume a teaching position

<sup>1</sup> Taken from a notice by Th. Loesener in *Berichte Deutsch. Bot. Gesellschaft*, xlviii, 1931, 205-225.

in a Berlin school. In 1878 he was appointed first assistant at the Berlin Botanic Garden, in 1883 curator, and in 1889 assistant director, a post which he held until his retirement in 1913.

Urban's production, in a long and industrious life, was large and touched many lines of botanical investigation. In his earlier years he carried out and published upon several morphological studies—on certain features of the *Rutaceae* and *Loasaceae*, on *Bauhinia*, pollination in *Lobeliaceae*, etc. Later there were miscellaneous taxonomic papers outside the main current of his activities. He had a taste for history and skill in narrative; this talent was turned to good advantage in his history of the Berlin Garden and his accounts of the many botanical explorers of Brazil and the West Indies.

After Eichler's death, Urban took editorial charge of the monumental "*Flora Brasiliensis*," to which he had already contributed the treatment of several families. In the face of considerable difficulties, financial and scientific, he brought the work to a triumphant completion in 1906, sixty-six years after it had been begun by von Martius.

In the midst of all this, he never lost sight of his main interest, the flora of the West Indies—a subject to which, in conversation, he always returned sooner or later. A series of excellent collectors explored for him systematically the flora of the various islands; and as their sendings came in and were worked up, the results were published in the nine volumes of "*Symbolae Antillanae*"—Urban's chief work, already a classic, distinguished for careful and exact scholarship, critical insight, and the ability to organize a multitude of variant forms into practical and reasonable classificatory schemes which is the mark of the good taxonomist.

Urban continued to work with scarcely diminished vigor and keenness until four days before his death, on the morning of his eighty-third birth-day, January 7, 1931.

C. A. Weatherby.

#### CLAUDE HALSTEAD VAN TYNE (1869–1930)

Fellow in Class III, Section 3, 1924

Claude Halstead Van Tyne was born in Tecumseh, Michigan, on October 16, 1869. After an experience of several years in business, and having reached the position of cashier in a northern Michigan

bank, he entered the University of Michigan, from which he received the degree of A.B. in 1896 at the age of 27. During his college years he undertook a 3,500-mile bicycle tour from Detroit across the Rocky Mountains (1894) and a similar trip of 2,500 miles in Europe (1895), meeting expenses by writing syndicated newspaper accounts of his adventures.

Upon graduation, he married Belle Joslyn of Chesaning, Michigan, and proceeded to Europe for study at Heidelberg, Leipzig, and Paris (1897-1898). They devoted a summer vacation to a 1,300-mile trip down the Danube in a rowing canoe, camping on the banks and writing the story of their expedition for a press syndicate. Returning to the United States, Van Tyne entered the Graduate School of the University of Pennsylvania as a candidate for the degree of Ph.D., which he received in 1900. His dissertation, *The Loyalists in the American Revolution* (1902) was a work of originality and great merit, and started him upon the field of research, the history of the American Revolution, to which he devoted his career. For two and a half years after receiving his degree, Van Tyne remained at Pennsylvania as teaching fellow in history, during which time he edited *The Letters of Daniel Webster* (1902), utilizing a mass of material which he had discovered more or less fortuitously.

In January, 1903, the newly-established Carnegie Institution of Washington made provision for historical research in the form of an exploration and inventory of the archives of the Federal Government, and Van Tyne was invited (with W. G. Leland) to undertake the investigation. The results of their joint labors were published by the Carnegie Institution in 1904: *Guide to the Archives of the Government of the United States in Washington*. During the six months that Van Tyne spent in Washington upon this task, he also made a substantial beginning of his one-volume history, *The American Revolution*, still one of the best short histories of the period, which was published (1905) in the coöperative history of *The American Nation*, edited by Albert Bushnell Hart.

When, in the autumn of 1903, Andrew C. McLaughlin, head of the Department of American History at the University of Michigan and Van Tyne's professor and early source of inspiration, went to Washington on leave of absence to organize the Department of Historical Research of the Carnegie Institution, Van Tyne was called to give

his courses at Michigan, where he was appointed an assistant professor. In 1906 he was appointed professor and succeeded McLaughlin as head of the Department of American history, later (1911) becoming head of the consolidated Department of History. Thus it was at Michigan that most of his academic life was passed.

Although he devoted himself with singleness of purpose to the principal task that he had set for himself as a graduate student, the writing of a major and definitive history of the American Revolution, he had many and varied interests. Those of the University always commanded his devotion, and he built up there one of the strongest departments of history in the country, and was instrumental, through his friendship with William L. Clements, in securing for the University the incomparable research library in American history that bears its donor's name. He was active in regional historical activities, and was president of the Michigan Historical Commission. In the affairs of the American Historical Association he also took an influential part and, for seven years, was a member of the Board of Editors of the *American Historical Review*.

In 1913-1914 he spent a sabbatical year in Europe, chiefly engaged in research in archives and libraries, and lectured in the provincial French universities on the James Hazen Hyde Foundation of the Cercle français of Harvard University. In 1921 he went, upon invitation, to India to observe the operations of the Indian Act of 1919, and published *India in Ferment* (1923). In 1927 he held the Sir George Watson lectureship in the British Universities, his lectures being published as *England and America, Rivals in the American Revolution*.

Meanwhile, his magnum opus was progressing. The first volume, *The Causes of the War of Independence*, appeared in 1920; the second *The War of Independence: American Phase*, in 1929. As he was pushing the work on the third volume, there appeared the symptoms of the long illness that was to bring his career prematurely to a close, and he died on March 15, 1930, at the age of sixty-one. His death, with his great work half finished, may be truly said to be an irreparable loss to American scholarship. Posthumously he received the Pulitzer Prize.

Van Tyne was an outstanding American historian, and was freely conceded to be foremost in his own field. Exacting of himself, he judged his own work and that of others by the highest standards.

An unequalled mastery of his sources, enlightened by an original point of view, made it possible for him to make a fresh and important contribution in a field long worked by many scholars.

WALDO G. LELAND.

### WILLIAM CUSHING WAIT (1860-1935)

Fellow in Class III, Section 1, 1914

William Cushing Wait, a Justice of the Supreme Judicial Court of Massachusetts, died in Medford, Massachusetts, January 28, 1935 after a year's illness due to overwork.

He was graduated from Harvard College in 1882, the tenth in his class, being awarded highest honors in history and an "oration." Three years later he was graduated from the Harvard Law School and at once entered upon the practice of his profession, at first in the office of Nathan Matthews, and later on his own account, until early in 1890 when he was invited to a partnership with Samuel J. Elder (Yale '73), then a leader in his profession. This association lasted until June, 1902, when he was appointed a Justice of the Superior Court of Massachusetts where he served until his promotion to the Supreme Judicial Court on December 19, 1923.

In 1907 he wrote for the report on the twenty-fifth anniversary of his graduation from college:

"Since appointed Justice of the Superior Court June 4, 1902, I have attended to my duty and my history is blank beyond that. To be heard of publicly, a judge must be a very able one or a mighty poor one. I know I am not the first and I hope I am not the second."

Notwithstanding this show of modesty, he met the general approval of the bar by courtesy, fairness and the justice of his decisions. In the higher Court his contact with the bar was greatly lessened. His opinions, which averaged about fifty per year, are marked by lucidity and conciseness and show profound study and knowledge of the law he was called on to administer.

In the years before his appointment to the Court necessarily ended political activities he was an active member of the young Cleveland Democrats, serving steadily on the city and town committees of that party and, at three elections, was a defeated candidate for the State legislature, although he was told, he says, that "he could have anything he wanted if he were a Republican."

He took an active interest in civic affairs. He was a member of the Commission that drafted the charter for the City of Medford, was elected to the first board of Aldermen and drafted the city ordinances. He was active in support of "no license" under local option and in the successful enforcement of the liquor laws. For many years he served as a member of the Medford School Committee and of the Sinking Fund Commission. In church matters he was a trustee of the Ministerial Fund of the Unitarian Church and for thirty years its secretary. Such is his catalog of ships.

His interests were many. He was deeply interested in music and a devoted member of the Harvard Musical Association. As a member of the Appalachian Mountain Club, despite a shortening of one leg, he was a mountain climber. His election as president of the Alpha Chapter of the Phi Beta Kappa Society brought him deep satisfaction. He was an active fellow of the Academy, and his membership in other societies, both scientific and legal, indicated his interests. While he reported to his college class on the occasion of his fiftieth reunion that "Work has been heavy," he found time to serve on a Commission on the Law's Delays.

He fully merited President Eliot's highest praise for a noted lawyer—"He was a useful citizen."

EDMUND A. WHITMAN.

### WINSLOW WARREN (1838-1930)

Fellow in Class III, Section 1, 1919

Winslow Warren—lawyer, man-of-affairs, public servant, historian, distinguished in all these fields—was born in Plymouth, Massachusetts, on March 20, 1838, the only son of Dr. Winslow and Margaret (Bartlett) Warren. His ancestry is set forth in an admirable memoir by William V. Kellen, in *Proc. Massachusetts Historical Society*, vol. 64; January 1931, which has been freely used in the preparation of this notice. This family history should interest the geneticist as well as the genealogist, representing as it does the purest Pilgrim descent on both sides of the house, with the Winslow, Bartlett and Warren strains—all able and all strongly characterized—predominant.

Winslow Warren was a delicate child but must have strengthened as he grew older, for he lived vigorously more than 92 years! He went

through the Grammar School and High School at Plymouth and was preparing for Harvard (the college of both his grandfathers) when the straitened circumstances of the family nearly led to his abandoning his education for a business chance with an uncle in New York. In accordance with sound Plymouth tradition, however, the family sacrifice was made, and he became a member of the Harvard Class of 1858, in which he ranked high and had a Commencement part on "The Character of the Slave in the Roman Empire." After some indecision he determined to study law, which he did for a year in the office of his distinguished kinsman the brilliant Sidney Bartlett then the leader of the Suffolk Bar; then he went to the Harvard Law School, from which he graduated in 1861. In the same year he was admitted to the Suffolk Bar—on the strength of his record and without examination!—and immediately "hung out his shingle." His family connections seem to have brought him at once some practice which his native capacity and character enabled him to extend rapidly. Moreover in March, 1864, after having refused appointment as Clerk of the United States Circuit Court, he was appointed a United States Commissioner, which office he retained for no less than thirty years—to March, 1894—and which brought him to public notice.

This success made financially possible his marriage, on January 3, 1867, to Mary Lincoln Tinkham, daughter of Spencer Tinkham, a Boston merchant, by whom he had four children—Charles, Margaret, Mary L. (Hussey), and Winslow.

The story of his life from this point on is one of steady professional and business advancement. Besides scholarly instincts and a universal good-will, he had practical shrewdness and a character which inspired affection and confidence. It was the era of fast growing wealth and the rapid expansion of the system of trusts for the management of family fortunes. Inevitably he was drawn into this field of responsibility for other people's property. Through his uncle, Charles H. Warren, who was President of the Boston & Providence Railroad, he early became Clerk of that corporation and then Associate Counsel for the road and as such handled for many years much miscellaneous legal business, including the wise and just settlement out of court of the hundreds of cases, involving millions of dollars, growing out of the dreadful "Bussey Bridge disaster" in 1887—a truly remarkable feat.

His interest in things political was marked. Even before he was

old enough to vote he had served as delegate from Plymouth to the last Whig convention, held at Worcester, and on attempting to register as a voter in Cambridge on the basis of his residence there while attending Law School, his youthful eruption in politics was resented in the Board of Aldermen which then controlled the voting lists. Mr. Warren won the suffrage only through the casting-vote of the Mayor! During the Civil War he became a "War Democrat," and a Democrat he remained all his life, though a frankly independent one. This, coupled with a certain originality in his opinions and positiveness and tenacity in those opinions when once formed, probably prevented his holding elective office although, in his only candidacy, he very nearly carried as a Democrat the rock-ribbed Republican town of Dedham! Forward movements in politics appealed to him. He was active in the early days of Civil Service Reform and in the founding, in 1885, of the Massachusetts Reform Club of which he was President from 1900 to 1902. He was a leader in the famous "Mugwump" campaign of 1884 and so came in close contact with Cleveland whose respect and friendship he won with the result that on February 27, 1897, in Cleveland's second term, he was appointed Collector of the Port of Boston. By tradition and in practice this post involves not only financially important and technically difficult administrative work, largely of a quasijudicial nature, but makes the incumbent the chief local political representative and mouth-piece of the administration in power. It is, therefore, a remarkable tribute to the public impression made by Winslow Warren's performance of his functions that, when McKinley succeeded Cleveland, he was kept in office until the expiration of his term, February 14, 1898, to the great satisfaction not only of commercial Boston but of all who value probity, scrupulous fairness, practical capacity, promptness and universal courtesy in high places.

In 1871, four years after their marriage, Mr. and Mrs. Warren, already prospering, removed to Dedham. There he identified himself with every good local work. Active in town-meetings, repeatedly Moderator, trustee of the Dedham Institution for Savings from 1872 to his death and President from 1904 to 1911, trustee of the Dedham Public Library, President of the Dedham Water Co., Chairman of the Committee on the Celebration of the Town's 250th Anniversary, it would be tedious to list all his contributions to Dedham's social,

political, business and intellectual life. In Dedham he built a pleasant house overlooking the river valley and there, to the end of his long, busy and useful life, he passed his days. His native Plymouth still claimed a share in him, however, and there for very many years, he spent his summer vacations.

It remains to speak of certain other interests. His taste for history blossomed into considerable activity as evidenced by a substantial list of addresses and papers. Naturally enough his field was chiefly—but not wholly—early New England, and he became an important factor in most of the appropriate organizations. As early as 1870 he was a member of the Massachusetts Society of the Cincinnati, and served it in almost every possible capacity including the Presidency, while in 1902 he became President of the General Society and so remained till his death, presiding over nine of its Triennial Meetings with vigor and enjoyment, the last being in his 92d year. He was elected to the Massachusetts Historical Society in 1873 and inevitably served it in various posts (including six terms as Vice-President) besides contributing important gifts, papers, and addresses, as well as memorials of no less than twenty-one friends in the Society whom he outlived. From 1918 on he was the senior member. Other organization interests in this field were the Pilgrim Society, Society of Mayflower Descendants, Bunker Hill Monument Association (President 1897–1905), and the Colonial Society to which he contributed several excellent papers.

Still another set of interests centered around his vigorous religious beliefs as a Unitarian. He was President of the Massachusetts Congregational Charitable Society from 1911 to 1926 and of the Society for Propagating the Gospel among the Indians and others in North America from 1910 to 1919. For several years he was President of the Unitarian Club of Boston and was active in the American Unitarian Association, several times presiding at meetings.

Nor does this exhaust the list of his organization interests for he served as President of the Economic Club of Boston, and was an incorporator, and from 1905 to 1908 President, of the University Club of Boston. His own University could not fail to claim his much-sought counsel and he was elected an Overseer of Harvard College in 1898 and re-elected in 1904.

On March 14, 1924, after more than 57 years of happy married life,

his wife died; and on April 3, 1930, he himself passed peacefully away in his 93d year, active and interested in life almost to the close. He was survived by all his four children except Winslow Warren junior, who died November 13, 1927.

The life above sketched was not sensational, perhaps; Winslow Warren himself called it only "fairly successful." Most would deem that much too modest. In any event that life had two marked characteristics. It was eminently satisfactory to those among whom it was lived and it was satisfactory to him who lived it. It was a happy life, and spread happiness. Winslow Warren fully solved the biological problem of adaptation to his environment. He knew how to live. He was "the Good Neighbor." Mr. Kellen has said that he "took Plymouth Rock for the corner stone of his character," and surely of the Pilgrim tradition which he loved he was not the least among the exemplifiers.

FRANCIS N. BALCH.

#### WILLIAM HENRY WELCH (1850-1934)

Fellow in Class II, Section 4, 1897

The death of Doctor Welch in Baltimore on April 30, 1934, at the age of eighty-four, closed a life of extraordinary fullness and significance, and marked the end of an era of magnificent pioneering in American medicine, of which Dr. Welch was the acknowledged prophet and leader.

Welch grew up in an environment saturated, as it were, with medical interests. His grandfather, father, and his father's four brothers were all doctors. His father, William Wickham Welch, distinguished beyond the rest, was notable among the practitioners of his period and highly regarded by the community of Norfolk, Connecticut. After his death a memorial fountain was erected in his honor; it stands beside the house in which he lived and in which his gifted son was born. The elder Dr. Welch's social interests extended into politics, through which he was carried into the legislature of the State of Connecticut and into the House of Representatives in Washington. Hence the son came naturally not only by his medical, but also his strong humanitarian instincts.

Graduating in 1870 from Yale College, William H. Welch entered

the College of Physicians and Surgeons (now Columbia University) in New York, but almost immediately after left there in order to pursue for a year advanced studies in chemistry at New Haven. This unusual act, considering the highly important part which organic chemistry was to play in the science and art of medicine, was not an impulsive gesture: it marked a particular quality of mind which sought to attain the fundamentals of knowledge, for the same kind of discrimination was displayed in a wider and deeper way when Welch became a student in Germany.

In 1874, Welch entered on an eighteen months internship at Bellevue Hospital in New York, the significant event of which was the opportunity to study pathology under the influence of Dr. Francis Delafield. The two succeeding years were spent in Germany under masters of anatomy, physiological chemistry, physiology, and pathology. Although the purpose had been to add to his knowledge of internal medicine, with neurology as a specialty, the resistless pressure of his mind was for fundamental knowledge. Hence Welch found himself at the end of that pregnant period a marked and accomplished pathologist with an exceptionally broad scientific training.

Pathology offered no independent career in the United States at that time. On his return to New York, Welch engaged in practice while, as professor of pathology, from 1878 to 1884, at the University and Bellevue Hospital Medical College he taught, investigated, and indeed gave the first real course in pathology ever offered in America.

Dr. Welch's European reputation and the success of his teaching in New York brought his definitive opportunity when in 1884 he was called to the Johns Hopkins University. The purpose was to guide the selection of the staff of the Johns Hopkins Hospital, then under construction, and of the associated medical school supposed soon to be created. But the immediate task was to perfect himself in bacteriology, just then becoming essential to the development of hygiene, and the more effective practice of medicine. Hence he returned to Germany for a year's study under Robert Koch and his pupils. On his return in 1885, he established a laboratory of pathology at Johns Hopkins University which was all embracing and included, besides gross and microscopic pathology, pathological physiology (experimental medicine) and bacteriology. No one before him, even in Europe, had attempted so ambitious an undertaking; and his success

was a tribute to his learning, his gifts as a teacher and influence as a stimulating investigator.

Dr. Welch's professional career in Baltimore was a long and distinguished one, and can be divided into three parts: from 1884 to 1916 he was professor of pathology; from 1917 to 1926, Director of the School of Hygiene and Public Health; and from 1926 to 1931, professor of the history of medicine. In all three of these important branches of learning, Welch not only became the leader of thought and action, but he created the means whereby action could be secured.

We have seen that he organized the first comprehensive school of pathology. He created as well the first model school of hygiene and public health, which was to be imitated abroad a few years later; and between his 75th and 80th years he conceived and established the department of the history of medicine, associated with the library which bears his name, conducting the teaching and research until his retirement at the age of eighty-one. In fact, Welch never actually retired from his professorial offices, for until his last illness he retained his extraordinary mental and physical vigor so fully that his brilliant intellectual activities can be said to have ceased only with his life.

This brief review does not take account of Dr. Welch's exceptionally broad general culture which included literature, history, and the arts, nor does it exhaust the significant professional undertakings in which he became engaged. He may be viewed as having been educator at large in the modernization and expansion of higher medical teaching and research in America, and his influence was potent also in the field of general, as distinguished from medical, science. As a member of the board of trustees of enterprises such as The Rockefeller Institute for Medical Research in New York and the Carnegie Institution of Washington he took a leading part in guiding their essential policies. He served also on state and national boards of health, and thus aided in securing the improvements in public health administration still going on widely in this country. Welch was active also in connection with scientific societies at home and abroad, and filled high offices in these important organizations. He was for four years president of the National Academy of Sciences, and took a leading part in the establishment of the National Research Council. He virtually founded the *Journal of Experimental Medicine*, the first strictly scientific medical periodical in the United States,

and was its editor for several years. Honors were conferred upon him by institutions of learning and governments at home and abroad. On his seventieth birthday his collected papers were assembled in three impressive volumes, while his eightieth birthday was celebrated with a large public function in Washington at which the President of the United States spoke, and concomitant celebrations were held in many other cities in the United States and even in Europe and Asia.

SIMON FLEXNER.

### RICHARD WETTSTEIN<sup>1</sup> (1863-1931)

Foreign Honorary Member in Class II, Section 2, 1927

In Wettstein modern botany, particularly in its phylogenetic aspects, lost one of its chief exponents. He was born at Vienna, June 30, 1863, and died at Trins in the Tirol, August 10, 1931. While still an undergraduate, he became assistant in the Botanic Garden at Vienna under Kerner von Marilaun. In 1892 he was appointed Professor of Systematic Botany in the German University at Prague, whence he was called back to Vienna in 1899 to fill the position as head of the Botanic Garden left vacant by the death of his old chief, Kerner. His first published work was in physiology, but his bent was always toward floristics and taxonomy and in this Kerner had encouraged him. Already, at Prague, he had published monographs of several critical genera, the treatment of the *Scrophulariaceae* in Engler and Prantl's *Pflanzenfamilien*, and a work on the principles of plant classification; the rest of his work was in this direction. He was a skilful and inspiring teacher; when, in 1901-1908, he brought out his *Handbuch der systematischen Botanik*, he put into it the lucidity, the grasp and the stimulating quality of his justly famed lectures. Though it ranks as a text-book and has been widely used as such, it is no mere compilation. It is rather an original essay on classification; the arrangement of families, much of the detail, and the phylogenetic hypotheses are particularly Wettstein's own.

He was a hard worker, "a skilful organizer, persuasive in speech and manner and a shrewd manager of men and situations."

C. A. WEATHERBY.

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<sup>1</sup> Abstracted from a notice by Otto Stapf in *Proc. Linn. Soc.*, London, 1931-32, 194-196.

## DAVID WHITE (1862-1935)

Fellow in Class II, Section 1, 1921

David White was one of the leading paleobotanists of the world. His knowledge of the fossil plants of the Paleozoic was probably unsurpassed.

He was born in Palmyra, New York, of early pre-Revolutionary stock, the youngest of a family of eight. Botany was a boyhood interest which came to assume a dominant place in his intellectual activities. At Cornell University, where he took the B.S. degree in 1886, he acquired a sound training in Geology and Paleontology, and became especially interested in the Devonian plant fragments found in the vicinity of Ithaca; these formed the basis for his bachelor thesis.

Upon graduation he joined the staff of the U. S. Geological Survey as assistant to the paleobotanist Lester F. Ward. He remained with the Survey until his death, becoming Senior Geologist in 1922. He was also Curator of Paleobotany in the Smithsonian Institution from 1903 to his death.

White's first paleobotanical publication was on the Cretaceous of Gay Head, Martha's Vineyard, in 1890. He had, however, already begun to study the floras of the Carboniferous, his first contribution on which appeared in 1893. His first large publication was *The Fossil Flora of the lower Coal Measures of Missouri*. This comprised Monograph 37 of the U. S. Geological Survey and is an authoritative work. Since Dr. Ward was primarily interested in the Mesozoic floras, David White soon began to specialize in the practically unoccupied field of the Paleozoic. He rapidly became the foremost Paleozoic paleobotanist of North America.

It was not alone the classification and description of fossil plants that interested White; he sought to interpret the facts he observed and recorded. The environmental conditions of these ancient floras aroused his keen interest, and in his later years he brought out much data as to the temperatures in which they had lived. For the understanding of the environment of the vegetation of past ages it was essential that he study the sediments in which it is preserved. Such study throws much light not only upon the physical conditions of the place of deposition and of the region where the sediment particles

were broken from the parent rock, but of the nature of the area through which the streams flowed carrying this sediment to its place of deposition. White thus developed into a stratigrapher of high rank.

He embodied his extensive study of the fossil plants of the Grand Canyon of the Colorado in many papers, and wrote much on Paleozoic climate as indicated by fossil plants. The study of the flora of the Coal Measures led him into a consideration of the coal itself, and he became a foremost authority on the evolution of coal. Significant contributions of the evolution of oil and on isostasy came from his pen. His publications number upwards of two hundred titles.

To his numerous scientific confreres David White was always an inspiration. Ever willing to share his encyclopedic knowledge, he was a joy to the earnest student. To anyone who sought his counsel he would devote time without stint. His welcoming smile and courteous demeanor and his enthusiasm made him a welcome addition to any gathering. Although many offers came to enter the commercial field at much larger salaries than that he received from the government, he was never tempted to leave the Survey. He preferred a position in which he could pursue truth for its own sake rather than one that would yield larger economic results.

Dr. White received during his life time gratifying recognition of the high place he held in the esteem of his fellows. He was given honorary degrees by Cincinnati and Rochester Universities and Williams College. He was a member of the National Academy of Sciences, being its home secretary from 1923 to 1927, and later a vice president. He was a member of the Paleontological, Geological and Botanical Societies of America, the American Academy of Arts and Sciences, the American Philosophical, and the Washington Academy of Sciences. In 1909 he was vice president of the Paleontological Society, in 1920 president of the Geological Society of America. From 1924 to 1927 he was chairman of the division of Geology and Geography of the National Research Council. Two of the principal medals of the National Academy were bestowed upon him. He received the Penrose medal of the Society of Economic Geologists and the Boverton Redwood Medal of the Institute of Petroleum Geologists of London. He was an honorary member of the Geological Societies of Belgium and China.

In 1886 he married Mary Elizabeth Houghton of Worcester,

Massachusetts. They had no children. Early in 1931 he had a slight paralytic shock from which he recovered almost entirely, with mental ability unimpaired. He succumbed to what was probably a second stroke, passing away quietly in his sleep during the night of February 6, 1935.

HERVEY W. SHIMER.

ERNEST HENRY WILSON<sup>1</sup> (1876-1930)

Fellow in Class II, Section 3, 1929

Ernest Henry Wilson was born at Chipping Campden in Gloucestershire, England, on February 15, 1876, the eldest son of Henry and Annie (Curtis) Wilson. After leaving school, he entered the nurseries of Messrs. Hewitt at Solihull, Warwickshire, as an apprentice. In 1892, he obtained a position in the Birmingham Botanic Garden and studied at the same time in the Technical School at Birmingham where he won the Queen's prize in botany. In 1897, he entered the Royal Botanic Gardens at Kew which gave him the opportunity to attend botanical lectures and to study the rich collections of living plants. This increased his interest in botany, so that he decided to enter the Royal College of Science at South Kensington with the intention of becoming a teacher of botany.

About that time, the nursery firm of Veitch and Sons asked the director of Kew Gardens to recommend a man to collect seeds and living plants in China. The choice fell on Wilson, and he left England in April 1899 for China, by the way of Boston and San Francisco, paying on this occasion a visit to the Arnold Arboretum. He landed in Hongkong and went first to Yunnan to meet Dr. A. Henry, who had been for many years a successful collector of plants, and who gave him all possible advice and instruction for his work. He returned to Hongkong and traveled from Shanghai up to Ichang. With Ichang as his headquarters, he collected in Hupeh during 1900 and 1901 a large number of seeds and living plants, many of them new to cultivation and of great horticultural value, and also much herbarium material.

In April, 1902, he returned to England and married Ellen Ganderton, of Edgbaston, Warwickshire. They had one daughter, Muriel Primrose.

<sup>1</sup> See also the biographical notice in *Journ. Arnold Arboretum*, 11, 1930, 181-192, pl.

As he had been so successful in his collecting, he was sent on a second expedition to China and collected during 1903 and 1904, chiefly in Szechuan. After his return to England, he assisted at Kew in the arrangement of his herbarium collections, and in 1906, he accepted a position as botanical assistant at the Imperial Institute in London. The success of Wilson as a collector attracted the attention of Professor C. S. Sargent, and he induced Wilson to undertake for the Arnold Arboretum another expedition to China. In 1907, he collected chiefly in Hupeh, and in 1908 in Szechuan, returning in the spring of 1909. As the conifers in western China did not bear cones in 1908, he was sent on his fourth Chinese expedition chiefly to secure cones and seeds of these plants. It was on this expedition that he met with a serious accident; following a narrow trail on a steep slope, the party was surprised by a landslide, and a bouncing rock broke Wilson's right leg in two places. He had to be carried with a temporarily bandaged leg for three days before he reached the nearest mission station where he could be cared for by physicians, but as infection had set in, his recovery took a long time. In March, 1911, he returned to the Arnold Arboretum where he remained until the end of 1913 working up his collections and preparing jointly with the writer an account of his collections under the title "*Plantae Wilsonianae*" edited in three volumes by C. S. Sargent. In 1915, he visited Japan, and after his return, he continued his work on "*Plantae Wilsonianae*," of which the last part was issued in January, 1917. Shortly after, he started on his sixth voyage to the Far East and collected during 1917 and 1918 in Korea, Japan and Formosa.

In April, 1919, Wilson was appointed Assistant Director of the Arnold Arboretum, and in July, 1920, he started on a tour to Australia, New Zealand, India, and Central and South Africa, returning to the Arnold Arboretum in August, 1922. In April, 1927, after the death of Professor C. S. Sargent, he was appointed Keeper of the Arnold Arboretum. On October 15, 1930, Wilson died together with his wife in an automobile accident, which occurred near Worcester, Mass., when returning from a visit to their daughter in Geneva, N. Y.

Wilson was a frequent contributor to horticultural and botanical periodicals and published a number of important horticultural and botanical books; he wrote of his experiences in China in "*A Naturalist in Western China*," "*Plant Hunting*," and "*China, Mother of*

Gardens"; he dealt with ornamental plants, chiefly trees and shrubs, in "Aristocrats of the Garden," "More Aristocrats of the Garden," "Aristocrats of Trees," and "America's Greatest Garden;" more strictly botanical are "Cherries of Japan," "The Conifers and Taxads of Japan," "A Monograph of Azaleas (with A. Rehder)," "The Lilies of Eastern Asia," and his contributions to "Plantae Wilsonianae."

Many honors were bestowed upon Wilson. He received several gold medals for his services to horticulture. In 1916, the honorary degree of A.M. was conferred on him by Harvard University, and the honorary degree of Sc.D. by Trinity College of Hartford, Conn., in 1930. He was elected Fellow of the American Academy of Arts and Sciences and honorary member of several horticultural societies, and also was a member of other scientific and horticultural societies. A new genus of Hamamelidaceae from China, *Sinowilsonia*, was named in his honor and about sixty species and varieties of Chinese plants bear his name.

Wilson's chief contribution to horticulture and botany lies in his exploration of China where he spent most of his time between 1899 and 1911. He was a born plant collector; endowed with strong physique, robust health, indomitable will power and a deep love of plants, he succeeded in collecting and introducing into cultivation a very large number of plants. He introduced more than a thousand species previously unknown to cultivation, and collected about 16,000 numbers of herbarium specimens, many of them new to science, with numerous duplicates, so that now his specimens are found in all important herbaria throughout the world, and his plants have spread to all gardens of temperate and subtropical regions.

ALFRED REHDER.

### JAY BACKUS WOODWORTH (1865-1925)

Fellow in Class II, Section 1, 1900

On the fourth of August 1925 Jay Backus Woodworth died. Woodworth was born on January 2, 1865, at Newfield, New York, not far from Ithaca. His father, Allen Beach Woodworth, was a Baptist minister of old colonial descent. His mother, Amanda Ette Smith, was also a New Englander. Governor Winthrop was one of his

distinguished ancestors, and other ancestors were prominent in the Indian Wars and the Revolution.

Brought up on a farm in a country noted for its geological formations Woodworth had a good opportunity to find fossils. He had Dana's *Textbook of Geology* and was able with that, to find the names of many of his specimens. There was one fossil that he could not identify so he wrote to Dana and also sent the fossil. Dana, much to his surprise, answered his letter in a very friendly way and told him he had discovered a new species. Woodworth told me that on that day he decided to become a geologist.

First it was necessary to earn money for his education, so when he finished high school he went to New York City and found employment as a clerk in the office of the New York Life Insurance Company. Later on he went to Boston and entered the service of the Edison Electric Company. Shortly after this he was made assistant manager of the company. He was now on the way toward financial success, but the call of geology was too strong, and in the fall of 1890 at the age of twenty-five, he entered the Lawrence Scientific School, took his degree of Bachelor of Science in 1894, and thereafter for years was Shaler's valuable assistant until Shaler's death. This was the only degree he ever received. However, his honors later in life were many.

Although a geologist of the old school, like Dana and Shaler, his work covered three main fields; glacial geology, structural geology, and seismology. His knowledge of the history of the science of geology was as profound as that of any man in America.

In glacial geology it may be said without exaggeration, that he did more than any man in New England. Chamberlin, Leverett, Salisbury and Taylor did more in the Middle West, but in the East no one began to know as much as Woodworth. His solution of the structural puzzle of Martha's Vineyard alone is enough to put him in the front rank of glacial and structural geologists. His classification of glacial deposits is also a classic. As important as these works, however, was his great work on ancient water levels of the Hudson and Champlain valleys, which he finished in 1905.

In 1908 Woodworth went to South America on the first Shaler Memorial Expedition. It was fitting that Shaler's righthand man should be the first to have this honor. During this trip Woodworth

proved what others had suspected, namely, that the big conglomerate of Late Carboniferous or Permian age in Brazil was a tillite, a consolidated till of glacial origin.

Probably the most comprehensive work Woodworth did in glacial geology was in cooperation with Dr. Edward Wigglesworth, on the glacial geology of southeastern New England, including Martha's Vineyard, Block Island, Nantucket, Cape Cod, Plymouth region and Buzzard's Bay region. The manuscript of this paper, handed in in 1919, was considered too bulky for publication by the United States Geological Survey. Finally the paper was published by the Museum of Comparative Zoölogy in 1934, fifteen years after Woodworth and Wigglesworth finished it.

Woodworth's first important work in structural and stratigraphical geology was the publication of the *Geology of the Richmond Basin, Virginia* in 1899. This work was done jointly with Shaler. The same year he published with Shaler the *Geology of the Narragansett Basin*.

Woodworth's knowledge of the structure of North America was profound. In 1899, Shaler, who had always wanted a summer school of geology in the Rockies, organized the first course in geology in Montana. He put Woodworth in charge. It was my privilege to go along as an undergraduate student. Woodworth conducted this course for twelve different summers, and as a result of it obtained a theory of mountain building which he taught his students in the course on the geology of North America.

One little paper Woodworth published describes sand-blasted pebbles. In 1894, while on the Cape, he found that pebbles favorably situated are shaped in definite ways and polished by the wind. Woodworth called such pebbles "Glyptoliths" and since his discovery they have been found in a great many places all over the earth.

Woodworth's seismological work was more recent. A Bosch-Omori instrument, imported from Germany, and the latest word in seismographs at the time, was installed in the Geological Museum early in 1908. Woodworth accomplished a great deal with this instrument and at the time of his death ranked the highest in America in accuracy of timing and in estimating distances of quakes. He was the first to call attention to the greater prevalence of earthquakes when the sun and moon were over certain meridians. He was also the first to discover that earthquakes take place in New England from

north to south. That is if there is a quake near Montreal the next quake can be looked for farther south, and the cycle finished in the south then starts all over again in the north.

Woodworth made an important discovery on the seismograph which has been noted by Charles F. Brooks, Secretary of the American Meteorological Society. Brooks says in part: "His approach to meteorology was perhaps unique. It was through his seismograph. Shortly after he established the Harvard Seismographic Station, in 1908, he found that the ground tilted more or less strongly in the direction of highest atmospheric pressure." The writer asked Woodworth why he did not publish his discovery of the tilting of the ground under high and low atmospheric pressures, and Woodworth said: "Another fellow found it too, Sayles." The "other fellow" was F. Napier Denison, then in charge of the seismograph at Victoria, B. C. He had as much right to claim credit for the discovery as Denison. Only a few knew that Woodworth made this discovery independently.

In 1906, while I was with him near Saratoga doing field work, he received an invitation to take the place of the late I. C. Russell, head of geology at the University of Michigan. This was a tempting offer. He sent the letter to President Eliot but was advised by Eliot to stay at Harvard, and that his promotion was assured.

Woodworth's love of old as well as new books was well known. He made a specialty of old editions of geological books, and his collections with their many first editions are now the property of the Division of Geology and Geography at Harvard. He had over fifty editions of Herodotus. He not only bought old books and prints but he was familiar with their contents. After he left college he took up Greek as a recreation, and was able to read it very well, as well as Latin. He was even well versed in the reading of Egyptian hieroglyphics as the inscription in the seismographic station attests. He translated it as follows: "When thy messenger comes to take thee be thou found by him ready. Follow thou silence."

As a lecturer Woodworth was not a success in large classes, but in conference with students he was most stimulating and helpful. There is a long list of able American geologists today, who owe their foundation, thoroughness, and perhaps their success more to J. B. Woodworth than to anyone else.

Woodworth married Genevieve Downs in 1891. Ethel Woodworth,

the only child, is a graduate of Radcliffe. Woodworth's last year was full of pain. He suffered a great deal from cardiac asthma. Late in the fall of 1924 he was advised to go to Florida. He went to Vero on the east coast and his stay during the winter months benefitted him to some extent. He returned in April apparently improved, but soon began to grow worse and the end came much sooner than expected, on August 4, 1925.

ROBERT W. SAYLES.

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00	William Ernest Castle	Belmont
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29	Lemuel Roscoe Cleveland	Jamaica Plain
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14	Edwin Grant Conklin	Princeton, N. J.
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17	Joseph Augustine Cushman	Sharon
35	J[ohn] Frank[lin] Daniel	Berkeley, Cal.
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33	Alden Benjamin Dawson	Belmont
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34	Cyrus Hartwell Fiske	Belmont
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31	William King Gregory	New York, N. Y.
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16	Frederic Thomas Lewis	Waban

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14	Ralph Stayner Lillie . . . . .	Chicago, Ill.
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02	Edmund Beecher Wilson . . . . .	New York, N. Y.
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33	Jeffries Wyman, Jr. . . . .	Chestnut Hill

CLASS II, SECTION IV—*Medicine and Surgery*—55

32	Joseph Charles Aub . . . . .	Belmont
29	James Bourne Ayer . . . . .	Milton
(28)	32 Franklin Greene Balch . . . . .	Boston
31	George Blumer . . . . .	New Haven, Conn.
21	Charles Macfie Campbell . . . . .	Cambridge
19	Alexis Carrel . . . . .	New York, N. Y.
31	William Bosworth Castle . . . . .	Brookline
30	David Cheever . . . . .	Boston

13	Henry Asbury Christian	Brookline
21	Rufus Cole	New York, N. Y.
14	Harvey Cushing	New Haven, Conn.
32	Elliott Carr Cutler	Brookline
31	Eugene Floyd DuBois	New York, N. Y.
33	Reginald Fitz	Brookline
11	Simon Flexner	New York, N. Y.
27	James Lawder Gamble	Brookline
22	Joseph Lincoln Goodale	Boston
18	Robert Battey Greenough	Brookline
21	Ross Granville Harrison	New Haven, Conn.
27	Percy Rogers Howe	Belmont
21	William Henry Howell	Baltimore, Md.
33	Edgar Erskine Hume	Washington, D. C.
15	Reid Hunt	Boston
34	Henry Jackson, Jr.	Chestnut Hill
12	Elliott Proctor Joslin	Boston
23	Roger Irving Lee	Brookline
29	Edwin Allen Locke	Williamstown
28	Warfield Theobald Longcope	Baltimore, Md.
32	Fred Bates Lund	Newton
33	George Burgess Magrath	Boston
13	Frank Burr Mallory	Brookline
21	William James Mayo	Rochester, Minn.
34	Leroy Matthew Simpson Miner	Newtonville
26	George Richards Minot	Brookline
28	William Lorenzo Moss	Augusta, Ga.
28	John Howard Mueller	West Roxbury
25	Robert Bayley Osgood	Boston
27	Joseph Hershey Pratt	Boston
35	Tracy Jackson Putnam	Brookline
34	William Carter Quinby	Brookline
34	Arthur Hiler Ruggles	Providence, R. I.
27	Andrew Watson Sellards	Boston
33	George Cheever Shattuck	Brookline
30	Torald Hermann Sollmann	Cleveland, Ohio
21	Charles Wardell Stiles	Washington, D. C.
14	Richard Pearson Strong	Boston

30	Fritz Bradley Talbot	Brookline
14	Ernest Edward Tyzzer	Wakefield
14	Frederick Herman Verhoeff	Brookline
27	Joseph Treloar Wearn	Cleveland, Ohio
33	Soma Weiss	Cambridge
25	Benjamin White	New York, N. Y.
02	Francis Henry Williams	Boston
12	Simeon Burt Wolbach	South Sudbury
23	Hans Zinsser	Boston

CLASS III—*The Social Arts*—137SECTION I—*Jurisprudence*—33

31	George Weston Anderson	Boston
(24) 32	Francis Noyes Balch	Jamaica Plain
06	Joseph Henry Beale	Cambridge
33	Harry Augustus Bigelow	Chicago, Ill.
33	Henry Wolf Biklé	Philadelphia, Pa.
33	Benjamin Nathan Cardozo	Washington, D. C.
33	John Dickinson	Washington, D. C.
31	Fred Tarbell Field	Newton
32	Felix Frankfurter	Cambridge
30	Thomas Hovey Gage	Worcester
33	Theodore Francis Green	Providence, R. I.
32	Walter Perley Hall	Fitchburg
33	Learned Hand	New York, N. Y.
18	Charles Evans Hughes	Washington, D. C.
31	Nathan Isaacs	Cambridge
32	Eldon Revare James	Cambridge
21	Frederick Lawton	Boston
32	Sayre Macneil	Azusa, Cal.
32	Calvert Magruder	Cambridge
31	William DeWitt Mitchell	New York, N. Y.
31	Edmund Morris Morgan	Arlington
31	Herbert Parker	South Lancaster
01	George Wharton Pepper	Philadelphia, Pa.
11	Roscoe Pound	Watertown
12	Elihu Root	New York, N. Y.

12	Arthur Prentice Rugg	Worcester
32	Francis Bowes Sayre	Washington, D. C.
21	Austin Wakeman Scott	Cambridge
35	James Brown Scott	Washington, D. C.
33	Harlan Fiske Stone	Washington, D. C.
32	Edward Sampson Thurston	Cambridge
14	Eugene Wambaugh	Cambridge
(28) 32	Edmund Allen Whitman	Cambridge

CLASS III, SECTION II—*Government, International Law, and Diplomacy*—26

33	George Hubbard Blakeslee	Worcester
33	Edwin Montefiore Borchard	New Haven, Conn.
32	William Richards Castle, Jr.	Washington, D. C.
32	Joseph Perkins Chamberlain	New York, N. Y.
33	Robert Treat Crane	New York, N. Y.
35	Tyler Dennett	Williamstown
31	Sidney Bradshaw Fay	Cambridge
27	William Cameron Forbes	Norwood
34	Edgar Stephenson Furniss	New Haven, Conn.
32	Joseph Clark Grew	Tokyo, Japan
35	Charles Grove Haines	Los Angeles, Cal.
16	Albert Bushnell Hart	Cambridge
27	Arthur Norman Holcombe	Cambridge
31	Manley Ottmer Hudson	Cambridge
32	Philip Carryl Jessup	New York, N. Y.
97	Abbott Lawrence Lowell	Boston
18	William MacDonald	New York, N. Y.
32	Charles Edward Merriam	Chicago, Ill.
32	Ogden Livingston Mills	New York, N. Y.
19	John Bassett Moore	New York, N. Y.
13	William Bennett Munro	Pasadena, Cal.
27	Westal Woodbury Willoughby	Washington, D. C.
32	William Franklin Willoughby	Washington, D. C.
14	George Grafton Wilson	Cambridge
27	Quincy Wright	Chicago, Ill.
33	Henry Aaron Yeomans	Cambridge

CLASS III, SECTION III—*Economics and Sociology*—50

33	Harold Hitchings Burbank . . . . .	Cambridge
16	John Bates Clark . . . . .	New York, N. Y.
34	John Maurice Clark . . . . .	Westport, Conn.
28	Arthur Harrison Cole . . . . .	Cambridge
31	Melvin Thomas Copeland . . . . .	Cambridge
31	William Leonard Crum . . . . .	Cambridge
32	William James Cunningham . . . . .	Cambridge
34	Winthrop More Daniels . . . . .	New Haven, Conn.
21	Clive Day . . . . .	New Haven, Conn.
13	Davis Rich Dewey . . . . .	Cambridge
32	Arthur Stone Dewing . . . . .	Newton
32	Wallace Brett Donham . . . . .	Boston
34	John Franklin Ebersole . . . . .	Belmont
12	Irving Fisher . . . . .	New Haven, Conn.
31	James Ford . . . . .	Cambridge
34	Ralph Evans Freeman . . . . .	Cambridge
13	Edwin Francis Gay . . . . .	Cambridge
33	Sheldon Glueck . . . . .	Cambridge
34	Robert Murray Haig . . . . .	New York, N. Y.
32	Henry Wyman Holmes . . . . .	Cambridge
34	Edwin Walter Kemmerer . . . . .	Princeton, N. J.
34	Frank Hyneman Knight . . . . .	Chicago, Ill.
34	Robert Morison MacIver . . . . .	New York, N. Y.
32	Walter Wallace McLaren . . . . .	Williamstown
32	Leon Carroll Marshall . . . . .	Washington, D. C.
33	Edward Sagendorph Mason . . . . .	Cambridge
34	Richard Stockton Meriam . . . . .	South Lincoln
34	Harry Alvin Millis . . . . .	Washington, D. C.
32	Frederick Cecil Mills . . . . .	New York, N. Y.
31	Wesley Clair Mitchell . . . . .	New York, N. Y.
34	Arthur Eli Monroe . . . . .	Cambridge
32	Harold Glenn Moulton . . . . .	Washington, D. C.
34	Edwin Griswold Nourse . . . . .	Washington, D. C.
32	William Fielding Ogburn . . . . .	Chicago, Ill.
33	Robert Ezra Park . . . . .	Chicago, Ill.
28	Warren Milton Persons . . . . .	New York, N. Y.
32	Leo S. Rowe . . . . .	Washington, D. C.

33	Josef Alois Schumpeter . . . . .	Cambridge
32	Carl Snyder . . . . .	New York, N. Y.
31	Pitirim Alexandrovich Sorokin . . . . .	Winchester
31	Oliver Mitchell Wentworth Sprague . . . . .	Cambridge
[89] 01	Frank William Taussig . . . . .	Cambridge
34	Frederick John Teggart . . . . .	Berkeley, Cal.
33	William Isaac Thomas . . . . .	New York, N. Y.
31	Donald Skeelee Tucker . . . . .	Belmont
33	Abbott Payson Usher . . . . .	Cambridge
34	Jacob Viner . . . . .	Chicago, Ill.
32	John Henry Williams . . . . .	Cambridge
34	Leo Wolman . . . . .	Washington, D. C.
34	Carle Clark Zimmerman . . . . .	Winchester

CLASS III, SECTION IV—*Administration and Affairs*—28

(25) 32	Charles Francis Adams . . . . .	Concord
(25) 32	Charles Foster Batchelder . . . . .	Cambridge
24	Ingersoll Bowditch . . . . .	Jamaica Plain
(26) 32	John Albert Cousens . . . . .	Tufts College
32	Henry Sturgis Dennison . . . . .	Framingham
(28) 32	William Lusk Webster Field . . . . .	Milton
16	Frank Johnson Goodnow . . . . .	Baltimore, Md.
35	Jerome Davis Greene . . . . .	Cambridge
(24) 32	Francis Russell Hart . . . . .	Boston
(28) 32	Edward Jackson Holmes . . . . .	Boston
34	Matt Bushnell Jones . . . . .	Newton Center
34	Henry Plimpton Kendall . . . . .	Walpole
(27) 32	Nathaniel Thayer Kidder . . . . .	Milton
32	Thomas William Lamont . . . . .	New York, N. Y.
34	Clarence Cook Little . . . . .	Bar Harbor, Me.
33	James Vance May . . . . .	Boston
(28) 31	Thomas Nelson Perkins . . . . .	Westwood
(24) 32	Andrew James Peters . . . . .	Jamaica Plain
02	Herbert Putnam . . . . .	Washington, D. C.
(28) 32	Alfred Lawrence Ripley . . . . .	Andover
34	Erwin Haskell Schell . . . . .	Cambridge
35	Henry Lee Shattuck . . . . .	Boston
(28) 32	Payson Smith . . . . .	Brookline

33	Albert Warren Stearns	Billerica
(25) 32	Charles Henry Taylor	Boston
34	Charles Franklin Thwing	Cleveland, O.
(24) 32	Edwin Sibley Webster	Brookline
(25) 32	Benjamin Loring Young	Weston

CLASS IV—*The Humanities*—207SECTION I—*Theology, Philosophy, and Psychology*—50

32	Michael Joseph Ahern	Weston
33	Gordon Willard Allport	Cambridge
32	James Rowland Angell	New Haven, Conn.
33	John Gilbert Beebe-Center	Swampscott
34	Edwin Garrigues Boring	Cambridge
28	Edgar Sheffield Brightman	Newton
31	Henry Addington Bruce	Cambridge
32	Leonard Carmichael	Providence, R. I.
33	J(ames) McKeen Cattell	Garrison, N. Y.
32	George Croft Cell	Reading
28	Walter Fenno Dearborn	Cambridge
18	Edmund Burke Delabarre	Providence, R. I.
24	Raymond Dodge	New Haven, Conn.
33	Curt John Ducasse	Providence, R. I.
30	William Henry Paine Hatch	Cambridge
32	William Healy	Boston
10	William Arthur Heidel	Middletown, Conn.
21	William Ernest Hocking	Cambridge
35	Clark Leonard Hull	New Haven, Conn.
33	Walter Samuel Hunter	Worcester
17	Frederick John Foakes Jackson	Englewood, N. J.
31	Truman Lee Kelley	Cambridge
28	Albert Cornelius Knudson	Cambridge
34	Kurt Koffka	Northampton
32	Karl Spencer Lashley	Belmont
13	William Lawrence	Boston
29	Clarence Irving Lewis	Lexington
33	Lee Sullivan McColleston	Tufts College
22	William McDougall	Durham, N. C.

10	Edward Caldwell Moore	Cambridge
31	Paul Elmer More	Princeton, N. J.
35	Henry Alexander Murray, Jr.	Boston
32	Arthur Darby Nock	Cambridge
32	William Cardinal O'Connell	Boston
28	Johnson O'Connor	Boston
17	Charles Edwards Park	Boston
18	Leighton Parks	London, England
18	Francis Greenwood Peabody	Cambridge
33	Carroll Cornelius Pratt	Cambridge
30	James Hugh Ryan	Omaha, Neb.
31	Henry Knox Sherrill	Boston
27	Willard Learoyd Sperry	Cambridge
29	Russell Henry Stafford	Brookline
34	Lewis Madison Terman	Stanford University, Cal.
34	Edward Lee Thorndike	New York, N. Y.
28	Henry Bradford Washburn	Cambridge
17	John Broadus Watson	New York, N. Y.
33	Frederic Lyman Wells	Newton Highlands
35	Robert Sessions Woodworth	New York, N. Y.
15	Robert Mearns Yerkes	New Haven, Conn.

CLASS IV, SECTION II—*History, Archaeology, and Anthropology*—42

18	Charles McLean Andrews	New Haven, Conn.
28	James Phinney Baxter, 3d	Cambridge
23	Carl Lotus Becker	Ithaca, N. Y.
27	Robert Pierpont Blake	Cambridge
12	Franz Boas	New York, N. Y.
(25) 32	William Brooks Cabot	Boston
34	Clarence Gordon Campbell	New York, N. Y.
12	George Henry Chase	Cambridge
12	Wilberforce Eames	New York, N. Y.
21	Max Farrand	San Marino, Cal.
21	William Scott Ferguson	Cambridge
10	Worthington Chauncey Ford	Cambridge
33	Henry Thatcher Fowler	Providence, R. I.
18	Evarts Boutell Greene	New York, N. Y.
13	Charles Homer Haskins	Cambridge

19	Charles Downer Hazen . . . . .	New York, N. Y.
14	Bert Hodge Hill . . . . .	Athens, Greece
27	Earnest Albert Hooton . . . . .	Cambridge
33	Halford Lancaster Hoskins . . . . .	Tufts College
15	Aleš Hrdlička . . . . .	Washington, D. C.
27	Alfred Vincent Kidder . . . . .	Washington, D. C.
12	Alfred Louis Kroeber . . . . .	Berkeley, Cal.
15	Kirsopp Lake . . . . .	Cambridge
22	George LaPiana . . . . .	Cambridge
32	Waldo Gifford Leland . . . . .	Washington, D. C.
20	Charles Howard McIlwain . . . . .	Belmont
14	Roger Bigelow Merriman . . . . .	Cambridge
15	Samuel Eliot Morison . . . . .	Boston
34	Robert Henry Pfeiffer . . . . .	Cambridge
14	George Andrew Reisner . . . . .	Boston
34	David Moore Robinson . . . . .	Baltimore, Md.
23	Michael Ivanovich Rostovtzeff . . . . .	New Haven, Conn.
33	Edward Sapir . . . . .	New Haven, Conn.
27	George Sarton . . . . .	Cambridge
34	Theodore Leslie Shear . . . . .	Princeton, N. J.
26	Herbert Joseph Spinden . . . . .	Brooklyn, N. Y.
16	John Osborne Sumner . . . . .	Boston
32	Charles Holt Taylor . . . . .	Cambridge
11	Charles Cutler Torrey . . . . .	New Haven, Conn.
11	Alfred Marston Tozzer . . . . .	Cambridge
20	Clark Wissler . . . . .	New York, N. Y.
34	Lawrence Counselman Wroth . . . . .	Providence, R. I.

CLASS IV, SECTION III—*Philology*—59

31	Edward Cooke Armstrong . . . . .	Princeton, N. J.
33	William Nickerson Bates . . . . .	Philadelphia, Pa.
35	Charles Henry Beeson . . . . .	Chicago, Ill.
33	Campbell Bonner . . . . .	Ann Arbor, Mich.
35	Robert Johnson Bonner . . . . .	Chicago, Ill.
33	Carleton Brown . . . . .	New York, N. Y.
21	Carl Darling Buck . . . . .	Chicago, Ill.
18	Edward Capps . . . . .	Princeton, N. J.
20	Walter Eugene Clark . . . . .	Cambridge

32	Ronald Salmon Crane	Chicago, Ill.
32	Morris William Croll	Princeton, N. J.
31	Samuel Hazzard Cross	Cambridge
20	Franklin Edgerton	New Haven, Conn.
21	Frank Edgar Farley	Middletown, Conn.
14	Jeremiah Denis Mathias Ford	Cambridge
35	Tenney Frank	Baltimore, Md.
30	James Geddes, Jr.	Brookline
13	Charles Hall Grandgent	Cambridge
16	Louis Herbert Gray	New York, N. Y.
25	William Chase Greene	Cambridge
13	Charles Burton Gulick	Cambridge
19	Roy Kenneth Hack	Cincinnati, Ohio
34	Austin Morris Harmon	New Haven, Conn.
31	Raymond Dexter Havens	Baltimore, Md.
18	George Lincoln Hendrickson	New Haven, Conn.
17	William Guild Howard	Cambridge
21	Eugene Xavier Louis Henry Hyvernat	Washington, D. C.
15	Carl Newell Jackson	Cambridge
13	James Richard Jewett	Cambridge
32	(Ralph) Hayward Keniston	Chicago, Ill.
34	Roland Grubb Kent	Philadelphia, Pa.
98	George Lyman Kittredge	Cambridge
33	Hans Kurath	Providence, R. I.
32	Ernest Felix Langley	Cambridge
[81] 98	Charles Rockwell Lanman	Cambridge
33	Ivan Mortimer Linforth	Berkeley, Cal.
31	Francis Peabody Magoun, Jr.	Cambridge
11	Albert Matthews	Boston
35	Benjamin Dean Meritt	Princeton, N. J.
28	William Albert Nitze	Chicago, Ill.
32	George Rapall Noyes	Berkeley, Cal.
34	William Abbott Oldfather	Urbana, Ill.
33	Howard Rollin Patch	Northampton
32	Arthur Stanley Pease	Cambridge
35	Henry Washington Prescott	Chicago, Ill.
13	Edward Kennard Rand	Cambridge
11	Fred Norris Robinson	Cambridge

31	Robert Kilburn Root . . . . .	Princeton, N. J.
35	Henry Arthur Sanders . . . . .	Ann Arbor, Mich.
18	Rudolph Schevill . . . . .	Berkeley, Cal.
32	Horatio Elwin Smith . . . . .	Providence, R. I.
04	Herbert Weir Smyth . . . . .	Cambridge
89	Franklin Bache Stephenson . . . . .	Washington, D. C.
32	William Thomson . . . . .	Cambridge
33	George Benson Weston . . . . .	Cambridge
28	Joshua Whatmough . . . . .	Arlington
30	Ernest Hatch Wilkins . . . . .	Oberlin, Ohio
33	Harry Austryn Wolfson . . . . .	Cambridge
33	Karl Young . . . . .	New Haven, Conn.

CLASS IV, SECTION IV—*The Fine Arts and Belles Lettres*—54

31	Stephen Vincent Benét . . . . .	New York, N. Y.
26	Frank Weston Benson . . . . .	Salem
32	(William) Welles Bosworth . . . . .	New York, N. Y.
33	John Alden Carpenter . . . . .	Chicago, Ill.
32	Chalmers Dancy Clifton . . . . .	New York, N. Y.
33	Charles Collens . . . . .	Newton Center
32	Kenneth John Conant . . . . .	Cambridge
34	Charles Jay Connick . . . . .	Newtonville
21	Frederick Shepherd Converse . . . . .	Westwood
18	Charles Allerton Coolidge . . . . .	Boston
29	Charles Townsend Copeland . . . . .	Cambridge
[17] 30	Ralph Adams Cram . . . . .	Boston
33	Cyrus Edwin Dallin . . . . .	Arlington Heights
34	Samuel Foster Damon . . . . .	Providence, R. I.
32	George Harold Edgell . . . . .	Cambridge
21	William Emerson . . . . .	Cambridge
33	Carl Engel . . . . .	New York, N. Y.
30	John Erskine . . . . .	New York, N. Y.
10	Arthur Fairbanks . . . . .	Hanover, N. H.
18	Edward Waldo Forbes . . . . .	Cambridge
31	Robert Frost . . . . .	South Shaftsbury, Vt.
27	Wallace Goodrich . . . . .	Boston
14	Robert Grant . . . . .	Boston
17	Chester Noyes Greenough . . . . .	Cambridge

29	Edward Burlingame Hill	Boston
31	Robert Silliman Hillyer	Cambridge
27	Charles Hopkinson	Manchester
12	Mark Antony DeWolfe Howe	Boston
18	Archer Milton Huntington	New York, N. Y.
31	Henry James	New York, N. Y.
(25) 32	William James	Cambridge
33	Leo Rich Lewis	Tufts College
20	John Ellerton Lodge	Washington, D. C.
21	John Livingston Lowes	Cambridge
21	Charles Donagh Maginnis	Brookline
31	Paul Manship	New York, N. Y.
31	Daniel Gregory Mason	New York, N. Y.
31	Frank Jewett Mather	Washington Crossing, Pa.
31	Kenneth Ballard Murdock	Cambridge
14	William Allan Neilson	Northampton
28	Curtis Hidden Page	Gilmanton, N. H.
21	William Lyon Phelps	New Haven, Conn.
(24) 32	Anthony John Philpott	Arlington
21	Chandler Rathfon Post	Cambridge
22	Paul Joseph Sachs	Cambridge
14	Ellery Sedgwick	Boston
19	Henry Dwight Sedgwick	Dedham
32	Henry Richardson Shepley	Brookline
33	David Stanley Smith	Woodbridge, Conn.
35	Walter Raymond Spalding	Cambridge
27	Edmund C. Tarbell	New Castle, N. H.
21	Charles Howard Walker	Boston
14	Owen Wister	Philadelphia, Pa.
22	Charles Henry Conrad Wright	Cambridge

## FOREIGN HONORARY MEMBERS—121

(Number limited to one hundred and thirty)

CLASS I—*Mathematical and Physical Sciences*—34SECTION I—*Mathematics and Astronomy*—9

22	Arthur Stanley Eddington . . . . .	Cambridge, England
34	Ronald Aylmer Fisher . . . . .	Harpenden, Herts
20	Jacques Salomon Hadamard . . . . .	Paris
21	Godfrey Harold Hardy . . . . .	Cambridge, England
27	Ejnar Hertzsprung . . . . .	Leyden
17	Tullio Levi-Civita . . . . .	Rome
03	Charles Emile Picard . . . . .	Paris
15	Charles Jean de la Vallée Poussin . . . . .	Louvain
29	Hermann Weyl . . . . .	Princeton, N. J.

CLASS I, SECTION II—*Physics*—9

29	Vilhelm Frimann Koren Bjerknes . . . . .	Oslo
24	Albert Einstein . . . . .	Princeton, N. J.
29	James Franck . . . . .	Baltimore, Md.
29	Abram F. Joffé . . . . .	Leningrad
03	Sir Joseph Larmor . . . . .	Cambridge, England
28	Friedrich Paschen . . . . .	Charlottenburg
14	Max Planck . . . . .	Berlin
15	Ernest Rutherford, Baron Rutherford . . . . .	Cambridge, England
02	Sir Joseph John Thomson . . . . .	Cambridge, England

CLASS I, SECTION III—*Chemistry*—8

29	Johannes N. Brönsted . . . . .	Copenhagen
27	Peter Debye . . . . .	Berlin
33	Jaroslav Heyrovsky . . . . .	Prague
19	Henri Louis Le Chatelier . . . . .	Paris
33	Fritz Paneth . . . . .	London
28	Sören Peter Lauritz Sörensen . . . . .	Copenhagen
29	Heinrich Wieland . . . . .	Munich
34	Richard Willstätter . . . . .	Munich

CLASS I, SECTION IV—*Technology and Engineering*—8

34	Paul Janet	Paris
34	Luigi Lombardi	Rome
25	Maurice d'Ocagne	Paris
29	Ludwig Prandtl	Göttingen
29	Emil Probst	Karlsruhe
29	Aurel Stodola	Zürich
15	Vsevolod Evgenievich Timonoff	Leningrad
31	Karl Willy Wagner	Berlin

CLASS II—*Natural and Physiological Sciences*—32SECTION I—*Geology, Mineralogy, and Physics of the Globe*—9

17	Frank Dawson Adams	Montreal
[15] 19	Charles Barrois	Lille
14	Waldemar Christofer Brögger	Oslo
29	Léon William Collet	Geneva
98	Albert Heim	Zürich
34	Arthur Holmes	Durham
22	Emmanuel de Margerie	Paris
21	Gustaf Adolf Frederik Molengraaff	Delft
18	Sir William Napier Shaw	London

CLASS II, SECTION II—*Botany*—7

32	Frederick Orpen Bower	Ripon
31	Ludwig Diels	Berlin
32	Kingo Miyabe	Sapporo, Japan
28	Alfred Barton Rendle	Leatherhead, Surrey, England
29	Otto Renner	Jena
32	Albert Charles Seward	Cambridge, England
35	Sir William Wright Smith	Edinburgh

CLASS II, SECTION III—*Zoology and Physiology*—9

23	George Albert Boulenger	Brussels
20	Maurice Caullery	Paris
34	Archibald Vivian Hill	London
31	August Krogh	Copenhagen
30	Louis Édouard Lapicque	Paris

19	George Henry Falkiner Nuttall	Cambridge, England
28	Charles Tate Regan	London
33	Hans Spemann	Freiburg i. Br.
28	D'Arcy Wentworth Thompson	St. Andrews

CLASS II, SECTION IV—*Medicine and Surgery*—7

18	Sir Thomas Barlow, Bart	London
27	Sir Henry Hallett Dale	London
33	Sir Arthur Keith	London
28	Mikinosuke Miyajima	Tokyo
27	Friedrich von Müller	Munich
18	Sir Charles Scott Sherrington	Oxford
29	Sir Arnold Theiler	London

CLASS III—*The Social Arts*—24SECTION I—*Jurisprudence*—9

33	Frantz Dahl	Copenhagen
27	Léon Duguit	Bordeaux
33	François Geny	Nancy
33	Hans Kelsen	Vienna
33	Juljusz Makarewicz	Lwów
95	Rt. Hon. Sir Frederick Pollock, Bart	London
27	Joseph Redlich	Vienna
33	Rudolph Stammler	Wernigerode a. H.
33	Giorgio Del Vecchio	Rome

SECTION II—*Government, International Law, and Diplomacy*—2

32	Paul Claudel	Paris
32	Hu Shih	Peiping

SECTION III—*Economics and Sociology*—11

32	Arthur Lyon Bowley	Harpenden, Herts
34	Gustav Cassel	Djursholm, Sweden
35	Luigi Einaudi	Turin
32	Ralph George Hawtrey	London
35	John Maynard Keynes	Cambridge, England
35	René Maunier	Paris

28	Arthur Cecil Pigou . . . . .	Cambridge, England
32	Charles Rist . . . . .	Fraisses (Loire)
33	Werner Sombart . . . . .	Berlin
35	S. Rudolph Steinmetz . . . . .	Amsterdam
34	Peter B. Struve . . . . .	Belgrade

SECTION IV—*Administration and Affairs*—2

33	Gösta A. Bagge . . . . .	Stockholm
33	Sir Josiah Stamp . . . . .	Shortlands, Kent

CLASS IV—*The Humanities*—31SECTION I—*Theology, Philosophy, and Psychology*—6

28	Henri Louis Bergson . . . . .	Paris
28	Benedetto Croce . . . . .	Naples
29	Étienne Gilson . . . . .	Melun
28	Edmund Husserl . . . . .	Freiburg i. B.
32	Pierre Janet . . . . .	Paris
28	Wolfgang Köhler . . . . .	Berlin

SECTION II—*History, Archaeology, and Anthropology*—10

33	Rafael Altamira y Crevea . . . . .	Madrid
29	Godfrey Rathbone Benson, Baron Charnwood . . . . .	London
97	Wilhelm Dörpfeld . . . . .	Berlin-Lichterfelde
31	Rt. Hon. Herbert Albert Laurens Fisher . . . . .	Oxford
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 Mazon, P. FHM, IV: 3  
 Mead, A. D. F, II: 3  
 Mead, W. J. F, II: 1  
 Meillet, A. FHM, IV: 3  
 Meinecke, F. FHM, IV: 2  
 Melander, A. L. F, II: 3  
 Menzel, D. H. F, I: 1  
 Meriam, R. S. F, III: 3  
 Meritt, B. D. F, IV: 3

- Merriam, C. E. F, III: 2  
 Merriam, J. C. F, II: 1  
 Merrill, E. D. F, II: 2  
 Merriman, R. B. F, IV: 2  
 Merritt, E. G. F, I: 2  
 Meyer, K. F. F, II: 3  
 Milas, N. A. F, I: 3  
 Miller, D. C. F, I: 2  
 Miller, G. A. F, I: 1  
 Miller, G. S. F, II: 3  
 Miller, J. A. F, I: 1  
 Miller, W. J. F, II: 1  
 Millikan, R. A. F, I: 2  
 Millis, H. A. F, III: 3  
 Mills, F. C. F, III: 3  
 Mills, O. L. F, III: 2  
 Mimno, H. R. F, I: 2  
 Miner, L. M. S. F, II: 4  
 Minot, G. R. F, II: 4  
 Mitchell, S. A. F, I: 1  
 Mitchell, W. C. F, III: 3  
 Mitchell, W. DeW. F, III: 1  
 Miyabe, K. FHM, II: 2  
 Miyajima, M. FHM, II: 4  
 Molengraaff, G. A. F. FHM, II: 1  
 Monroe, A. E. F, III: 3  
 Moore, E. C. F, IV: 1  
 Moore, J. B. F, III: 2  
 More, P. E. F, IV: 1  
 Moreland, E. L. F, I: 4  
 Morgan, E. M. F, III: 1  
 Morgan, T. H. F, II: 3  
 Morison, S. E. F, IV: 2  
 Morley, F. F, I: 1  
 Morris, F. K. F, II: 1  
 Morse, H. W. F, I: 2  
 Morse, M. F, I: 1  
 Morse, P. M. F, I: 2  
 Moss, W. L. F, II: 4  
 Moulton, F. R. F, I: 1  
 Moulton, H. G. F, III: 3  
 Mueller, E. F, I: 3  
 Müller, F. von. FHM, II: 4  
 Mueller, J. H. F, II: 4  
 Munro, W. B. F, III: 2  
 Munroe, C. E. F, I: 3  
 Murdock, K. B. F, IV: 4  
 Murray, G. FHM, IV: 4  
 Murray, H. A., Jr. F, IV: 1  
 Neal, H. V. F, II: 3  
 Neilson, W. A. F, IV: 4  
 Newhouse, W. H. F, II: 1  
 Nichols, E. L. F, I: 2  
 Nitze, W. A. F, IV: 3  
 Nock, A. D. F, IV: 1  
 Norris, J. F. F, I: 3  
 Norton, A. E. F, I: 4  
 Norton, C. L. F, I: 2  
 Nourse, E. G. F, III: 3  
 Noyes, A. A. F, I: 3  
 Noyes, G. R. F, IV: 3  
 Noyes, W. A. F, I: 3  
 Noyes, W. A., Jr. F, I: 3  
 Nuttall, G. H. F. FHM, II: 3  
 d'Ocagne, M. FHM, I: 4  
 O'Connell, W. H. F, IV: 1  
 O'Connor, J. F, IV: 1  
 Oertel, H. FHM, IV: 3  
 Ogburn, W. F. F, III: 3  
 Oldenberg, O. F, I: 2  
 Oldfather, W. A. F, IV: 3  
 Olmsted, F. L. F, I: 4  
 Osgood, R. B. F, II: 4  
 Osterhout, W. J. V. F, II: 2  
 Page, C. H. F, IV: 4  
 Page, L. F, I: 2  
 Palache, C. F, II: 1  
 Paneth, F. FHM, I: 3  
 Park, C. E. F, IV: 1  
 Park, C. F. F, I: 4  
 Park, R. E. F, III: 3  
 Parker, G. H. F, I: 2  
 Parker, H. F, III: 1  
 Parks, L. F, IV: 1  
 Paschen, F. FHM, I: 2  
 Patch, H. R. F, IV: 3  
 Peabody, F. G. F, IV: 1  
 Pearl, R. F, II: 3  
 Pearse, L. F, I: 4  
 Pearson, K. FHM, IV: 2  
 Pease, A. S. F, IV: 3  
 Peers, E. A. FHM, IV: 4

- Peirce, G. J. F, II: 2  
 Pender, H. F, I: 4  
 Pepper, G. W. F, III: 1  
 Perkins, T. N. F, III: 4  
 Persons, W. M. F, III: 3  
 Peters, A. J. F, III: 4  
 Pfeiffer, R. H. F, IV: 2  
 Phelps, W. L. F, IV: 4  
 Phillips, H. B. F, I: 1  
 Phillips, J. C. F, II: 3  
 Philpott, A. J. F, IV: 4  
 Picard, C. E. FHM, I: 1  
 Pickard, G. W. F, I: 4  
 Pickering, W. H. F, I: 1  
 Pidal, R. M. FHM, IV: 3  
 Pierce, G. W. F, I: 2  
 Pigou, A. C. FHM, III: 3  
 Pilsbry, H. A. F, II: 3  
 Pirenne, H. FHM, IV: 2  
 Planck, M. FHM, I: 2  
 Pollock, Sir F. FHM, III: 1  
 Poor, C. L. F, I: 1  
 Post, C. R. F, IV: 4  
 Pound, R. F, III: 1  
 Prandtl, L. FHM, I: 4  
 Pratt, C. C. F, IV: 1  
 Pratt, F. H. F, II: 3  
 Pratt, J. H. F, II: 4  
 Prescott, H. W. F, IV: 3  
 Prescott, S. C. F, I: 3  
 Probst, E. FHM, I: 4  
 Putnam, H. F, III: 4  
 Putnam, T. J. F, II: 4  
 Quinby, W. C. F, II: 4  
 Rabaud, H. FHM, IV: 4  
 Rand, E. K. F, IV: 3  
 Rand, H. W. F, II: 3  
 Rapport, D. F, II: 3  
 Raymond, P. E. F, II: 1  
 Redfield, A. C. F, II: 3  
 Redlich, J. FHM, III: 1  
 Regan, C. T. FHM, II: 3  
 Rehder, A. F, II: 2  
 Reisner, G. A. F, IV: 2  
 Rendle, A. B. FHM, II: 2  
 Renner, O. FHM, II: 2  
 Richards, A. N. F, II: 3  
 Richards, R. H. F, I: 3  
 Richardson, R. G. D. F, I: 1  
 Richtmyer, F. K. F, I: 2  
 Riddle, O. F, II: 3  
 Ripley, A. L. F, III: 4  
 Rist, C. FHM, III: 3  
 Ritter, W. E. F, II: 3  
 Robinson, D. M. F, IV: 2  
 Robinson, F. N. F, IV: 3  
 Rogers, A. F. F, II: 1  
 Root, E. F, III: 1  
 Root, R. K. F, IV: 3  
 Rosanoff, M. A. F, I: 3  
 Rossby, C. G. A. F, II: 1  
 Rostovtzeff, M. I. F, IV: 2  
 Rowe, L. S. F, III: 3  
 Rugg, A. P. F, III: 1  
 Ruggles, A. H. F, II: 4  
 Russell, G. E. F, I: 4  
 Russell, H. N. F, I: 1  
 Rutherford, Baron FHM, I: 2  
 Ruthven, A. G. F, II: 3  
 Rutledge, G. F, I: 1  
 Ryan, J. H. F, I: 1  
 Sachs, P. J. F, IV: 4  
 Sanders, H. A. F, IV: 3  
 Sapir, E. F, IV: 2  
 Sarton, G. F, IV: 2  
 Saunders, F. A. F, I: 2  
 Sauveur, A. F, I: 4  
 Sax, K. F, II: 2  
 Sayles, R. W. F, II: 1  
 Sayre, F. B. F, III: 1  
 Scatchard, G. F, I: 3  
 Schaller, W. T. F, II: 1  
 Schell, E. H. F, III: 4  
 Schevill, R. F, IV: 3  
 Schlesinger, F. F, I: 1  
 Schuchert, C. F, II: 1  
 Schumb, W. C. F, I: 3  
 Schumpeter, J. A. F, III: 3  
 Scott, A. W. F, III: 1  
 Scott, J. B. F, III: 1  
 Scott, W. B. F, II: 1  
 Sedgwick, E. F, IV: 4

- Sedgwick, H. D. F, IV: 4  
 Sellards, A. W. F, II: 4  
 Setchell, W. A. F, II: 2  
 Seward, A. C. FHM, II: 2  
 Shapley, H. F, I: 1  
 Shattuck, G. C. F, II: 4  
 Shattuck, H. L. F, III: 4  
 Shaw, Sir W. N. FHM, II: 1  
 Shear, T. L. F, IV: 2  
 Shepley, H. R. F, IV: 4  
 Sherrill, H. K. F, IV: 1  
 Sherrill, M. S. F, I: 3  
 Sherrington, Sir C. S. FHM, II: 4  
 Shimer, H. W. F, II: 1  
 Sinnott, E. W. F, II: 2  
 Slater, J. C. F, I: 2  
 Slipper, V. M. F, I: 1  
 Slocum, F. F, I: 1  
 Smith, D. S. F, IV: 4  
 Smith, G. M. F, II: 2  
 Smith, H. E. F, IV: 3  
 Smith, H. M. F, I: 3  
 Smith, L. B. F, I: 3  
 Smith, P. F, III: 4  
 Smith, Sir W. W. FHM, II: 2  
 Smyth, H. L. F, I: 4  
 Smyth, H. W. F, IV: 3  
 Snyder, C. F, III: 3  
 Snyder, V. F, I: 1  
 Sørensen, S. P. L. FHM, I: 3  
 Sollmann, T. H. F, II: 4  
 Sombart, W. FHM, III: 3  
 Sorokin, P. A. F, III: 3  
 Spalding, W. R. F, IV: 4  
 Spemann, H. FHM, II: 3  
 Sperry, W. L. F, IV: 1  
 Spinden, H. J. F, IV: 2  
 Spofford, C. M. F, I: 4  
 Sprague, O. M. W. F, III: 3  
 Stafford, R. H. F, IV: 1  
 Stakman, E. C. F, II: 2  
 Stammer, R. FHM, II: 1  
 Stamp, Sir J. FHM, III: 4  
 Stearns, A. W. F, III: 4  
 Stebbins, J. F, I: 1  
 Stein, Sir A. FHM, IV: 2  
 Steinmetz, S. R. FHM, III: 3  
 Stephenson, F. B. F, IV: 3  
 Stetson, H. T. F, I: 1  
 Stevens, J. F. F, I: 4  
 Stieglitz, J. O. F, I: 3  
 Stiles, C. W. F, II: 4  
 Stiles, P. G. F, II: 3  
 Stodola, A. FHM, I: 4  
 Stone, H. F. F, III: 1  
 Stone, J. S. F, I: 2  
 Stone, M. H. F, I: 1  
 Strong, R. P. F, II: 4  
 Struik, D. J. F, I: 1  
 Struve, P. B. FHM, III: 3  
 Sumner, J. O. F, IV: 2  
 Talbot, F. B. F, II: 4  
 Tamarkin, J. D. F, I: 1  
 Tarbell, E. C. F, IV: 4  
 Taussig, F. W. F, III: 3  
 Taylor, C. H. F, III: 4  
 Taylor, C. H. F, IV: 2  
 Taylor, F. B. F, II: 1  
 Teggart, F. J. F, III: 3  
 Terman, L. M. F, IV: 1  
 Terry, C. S. FHM, IV: 2  
 Theiler, Sir A. FHM, II: 4  
 Thomas, F. W. FHM, IV: 3  
 Thomas, W. I. F, III: 3  
 Thompson, D'A. W. FHM, II: 3  
 Thompson, M. deK. F, I: 2  
 Thomson, E. F, I: 2  
 Thomson, Sir J. J. FHM, I: 2  
 Thomson, W. F, IV: 3  
 Thorndike, E. L. F, IV: 1  
 Thurston, E. S. F, III: 1  
 Thwing, C. F. F, III: 4  
 Timonoff, V. E. FHM, I: 4  
 Tolman, R. C. F, I: 3  
 Torrey, C. C. F, IV: 2  
 Tozzer, A. M. F, IV: 2  
 Trelease, W. F, II: 2  
 Trevelyan, G. M. FHM, IV: 2  
 Tucker, D. S. F, III: 3  
 Tyler, H. W. F, I: 1  
 Tyzzer, E. E. F, II: 4  
 Usher, A. P. F, III: 3

- Vallarta, M. S. F, I: 2  
 Vallée Poussin, C. J. de la. FHM, I: 1  
 Van de Graaff, R. J. F, I: 2  
 Van Vleck, J. H. F, I: 2  
 Vaughan, T. W. F, II: 1  
 Veblen, O. F, I: 1  
 Vecchio, G. Del. FHM, III: 1  
 Verhoeff, F. H. F, II: 4  
 Viner, J. F, III: 3  
 Wagner, K. W. FHM, I: 4  
 Walker, C. H. F, IV: 4  
 Walsh, J. L. F, I: 1  
 Wambaugh, E. F, III: 1  
 Warner, E. P. F, I: 4  
 Warren, B. E. F, I: 2  
 Warren, C. H. F, II: 1  
 Washburn, H. B. F, IV: 1  
 Watson, J. B. F, IV: 1  
 Wearn, J. T. F, II: 4  
 Weatherby, C. A. F, II: 2  
 Webster, D. L. F, I: 2  
 Webster, E. S. F, III: 4  
 Weiss, S. F, II: 4  
 Wells, A. E. F, I: 4  
 Wells, F. L. F, IV: 1  
 Weston, G. B. F, IV: 3  
 Weston, R. S. F, I: 4  
 Weston, W. H. F, II: 2  
 Wetmore, R. H. F, II: 2  
 Weyl, H. FHM, I: 1  
 Weyssse, A. W. F, II: 3  
 Whatmough, J. F, IV: 3  
 Wheeler, W. M. F, II: 3  
 White, B. F, II: 4  
 Whitehead, A. N. F, I: 1  
 Whitlock, H. P. F, II: 1  
 Whitman, E. A. F, III: 1  
 Whitney, W. R. F, I: 3  
 Whittlesey, D. S. F, II: 1  
 Widder, D. V. F, I: 1  
 Wieland, H. FHM, I: 3  
 Wilkins, E. H. F, IV: 3  
 Williams, F. H. F, II: 4  
 Williams, J. H. F, III: 3  
 Williams, R. S. F, I: 3  
 Willis, B. F, II: 1  
 Willoughby, W. F. F, III: 2  
 Willoughby, W. W. F, III: 2  
 Willstätter, R. FHM, I: 3  
 Wilson, E. B. F, II: 3  
 Wilson, E. B. F, I: 2  
 Wilson, G. G. F, III: 2  
 Winsor, F. E. F, I: 4  
 Wissler, C. F, IV: 2  
 Wister, O. F, IV: 4  
 Wolbach, S. B. F, II: 4  
 Wolff, J. E. F, II: 1  
 Wolfson, H. A. F, IV: 3  
 Wolman, L. F, III: 3  
 Wood, R. W. F, I: 2  
 Woodman, A. G. F, I: 3  
 Woods, F. A. F, II: 3  
 Woods, F. S. F, I: 1  
 Woodworth, R. S. F, IV: 1  
 Worcester, J. R. F, I: 4  
 Worrall, D. E. F, I: 3  
 Wright, C. H. C. F, IV: 4  
 Wright, F. E. F, II: 1  
 Wright, Q. F, III: 2  
 Wroth, L. C. F, IV: 2  
 Wyman, J., Jr. F, II: 3  
 Yeomans, H. A. F, III: 2  
 Yerkes, R. M. F, IV: 1  
 Young, B. L. F, III: 4  
 Young, K. F, IV: 3  
 Zeleny, J. F, I: 2  
 Zimmerman, C. C. F, III: 3  
 Zinsser, H. F, II: 4

## STATUTES AND STANDING VOTES.

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### STATUTES.

*Adopted November 8, 1911: amended May 8, 1912, January 8, and May 14, 1913, April 14, 1915, April 12, 1916, April 10, 1918, May 14, 1919, February 8, April 12, and December 13, 1922, February 14, March 14, and October 10, 1923, March 10, 1926, May 9, 1928, April 8 and November 11, 1931, April 12, 1933, and February 14, 1934.*

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### CHAPTER I.

#### THE CORPORATE SEAL.

ARTICLE 1. The Corporate Seal of the Academy shall be as here depicted:



ARTICLE 2. The Recording Secretary shall have the custody of the Corporate Seal.

*See Chap. v, art. 3: chap. vi, art. 2.*

## CHAPTER II.

## FELLOWS AND FOREIGN HONORARY MEMBERS AND DUES.

ARTICLE 1. The Academy consists of Fellows, who are either citizens or residents of the United States of America, and Foreign Honorary Members. They are arranged in four Classes, according to the Arts and Sciences in which they are severally proficient, and each Class is divided into four Sections, namely:

CLASS I. *The Mathematical and Physical Sciences*

- Section 1. Mathematics and Astronomy
- Section 2. Physics
- Section 3. Chemistry
- Section 4. Technology and Engineering

CLASS II. *The Natural and Physiological Sciences*

- Section 1. Geology, Mineralogy, and Physics of the Globe
- Section 2. Botany
- Section 3. Zoölogy and Physiology
- Section 4. Medicine and Surgery

CLASS III. *The Social Arts*

- Section 1. Jurisprudence
- Section 2. Government, International Law, and Diplomacy
- Section 3. Economics and Sociology
- Section 4. Administration and Affairs

CLASS IV. *The Humanities*

- Section 1. Theology, Philosophy, and Psychology
- Section 2. History, Archæology, and Anthropology
- Section 3. Philology
- Section 4. The Fine Arts and Belles Lettres

ARTICLE 2. The number of Fellows shall not exceed Eight hundred, of whom not more than Six hundred shall be residents of Massachusetts, nor shall there be more than Two hundred and twenty in any one Class.

ARTICLE 3. The number of Foreign Honorary Members shall not exceed One hundred and thirty. They shall be chosen from among citizens of foreign countries most eminent for their discoveries and

attainments in any of the Classes above enumerated. There shall not be more than Thirty-five in any one Class.

ARTICLE 4. If any person, after being notified of his election as Fellow, shall neglect for six months to accept in writing, or, if a Fellow resident within fifty miles of Boston shall neglect to pay his Admission Fee, his election shall be void; and if any Fellow resident within fifty miles of Boston shall neglect to pay his Annual Dues for six months after they are due, provided his attention shall have been called to this Article of the Statutes in the meantime, he shall cease to be a Fellow; but the Council may suspend the provisions of this Article for a reasonable time.

With the previous consent of the Council, the Treasurer may dispense (*sub silentio*) with the payment of the Admission Fee or of the Annual Dues or both whenever he shall deem it advisable. In the case of officers of the Army or Navy who are out of the Commonwealth on duty, payment of the Annual Dues may be waived during such absence if continued during the whole financial year and if notification of such expected absence be sent to the Treasurer. Upon similar notification to the Treasurer, similar exemption may be accorded to Fellows subject to Annual Dues, who may temporarily remove their residence for at least two years to a place more than fifty miles from Boston.

If any person elected a Foreign Honorary Member shall neglect for six months after being notified of his election to accept in writing, his election shall be void.

*See Chap. vii, art. 2.*

ARTICLE 5. Every Fellow resident within fifty miles of Boston hereafter elected shall pay an Admission Fee of Ten dollars, unless previously as an Associate he has paid an Admission Fee of like amount.

Every Fellow resident within fifty miles of Boston shall, and others may, pay such Annual Dues, not exceeding Fifteen dollars, as shall be voted by the Academy at each Annual Meeting, when they shall become due; but any Fellow shall be exempt from the annual payment if, at any time after his admission, he shall pay into the treasury Two hundred dollars in addition to his previous payments. Any Fellow shall also be exempt from Annual Dues who has paid such dues

for forty years, or, having attained the age of seventy-five has paid dues for twenty-five years.

All Commutations of the Annual Dues shall be and remain permanently founded, the interest only to be used for current expenses.

Any Fellow not previously subject to Annual Dues who takes up his residence within fifty miles of Boston, shall pay to the Treasurer within three months thereafter Annual Dues for the current year, failing which his Fellowship shall cease; but the Council may suspend the provisions of this Article for a reasonable time.

Only Fellows who pay Annual Dues or have commuted them may hold office in the Academy or serve on the Standing Committees or vote at meetings.

ARTICLE 6. Fellows who pay or have commuted the Annual Dues and Foreign Honorary Members shall be entitled to receive gratis one copy of all Publications of the Academy issued after their election.

*See Chap. xi, art. 2.*

ARTICLE 7. Diplomas signed by the President and the Vice-President of the Class to which the member belongs, and countersigned by the Secretaries, shall be given to Foreign Honorary Members and to Fellows on request.

ARTICLE 8. If, in the opinion of a majority of the entire Council, any Fellow or Foreign Honorary Member shall have rendered himself unworthy of a place in the Academy, the Council shall recommend to the Academy the termination of his membership; and if three-fourths of the Fellows present, out of a total attendance of not less than fifty at a Stated Meeting, or at a Special Meeting called for the purpose, shall adopt this recommendation, his name shall be stricken from the Roll.

*See Chap. iii; chap. vi, art. 1; chap. x, art. 1, 7; chap. xi, art. 2.*

### CHAPTER III.

#### ELECTION OF FELLOWS AND FOREIGN HONORARY MEMBERS.

The procedure in the election of Fellows and Foreign Honorary Members shall be as follows:

Nominations to Fellowship or Foreign Honorary Membership in any Section must be signed by Two Fellows of that Section, or by three Fellows of any Sections, and sent to the Corresponding Secretary ac-

accompanied by a statement of the qualifications of the nominee and brief biographical data.

Notice shall be sent to every Fellow not later than the fifteenth of January in each year, reminding him that all nominations must be in the hands of the Corresponding Secretary before the fifteenth of February following.

A list of the nominees, giving a brief account of each, with the names of the nominators, shall be sent to every Fellow with a request that he return the list with such confidential comments and indications of preference as he may choose to make.

All the nominations, with any comments thereon and with expressions of preference on the part of the Fellows, shall be referred to the appropriate Class Committees, which shall canvass them, and report their recommendations in writing to the Council before the Stated Meeting of the Academy in April.

Elections of Fellows and Foreign Honorary Members shall be made by the Council before the Annual Meeting in May, and announced at that meeting.

Persons nominated in any year, but not elected, may be carried over to the list of nominees for the next year at the discretion of the Council, but shall not be further continued unless renominated.

*See Chap. ii; chap. vi, art. 1; chap. x, art. 1.*

## CHAPTER IV.

### OFFICERS.

ARTICLE 1. The Officers of the Academy shall be a President (who shall be Chairman of the Council), four Vice-Presidents (one from each Class), a Corresponding Secretary (who shall be Secretary of the Council), a Recording Secretary, a Treasurer, a Librarian, and an Editor, all of whom shall be elected by ballot at the Annual Meeting, and shall hold their respective offices for one year, and until others are duly chosen and installed.

There shall be also sixteen Councillors, one from each Section of each Class. At each Annual Meeting four Councillors, one from each Class, shall be elected by ballot to serve for the full term of four years and until others are duly chosen and installed. The same Fellow shall not be eligible for two successive terms.

The Councillors, with the other officers previously named, and the Chairman of the House Committee, *ex officio*, shall constitute the Council.

*See Chap. xi, art. 1.*

ARTICLE 2. If any officer be unable, through death, absence, or disability, to fulfill the duties of his office, or if he shall resign, his place may be filled by the Council in its discretion for any part or the whole of the unexpired term.

ARTICLE 3. At the Stated Meeting in March, the President shall appoint a Nominating Committee of four Fellows having the right to vote, one from each Class. This Committee shall prepare a list of nominees for the several offices to be filled, and for the Standing Committees, and file it with the Recording Secretary not later than four weeks before the Annual Meeting.

*See Chap. vi, art. 2.*

ARTICLE 4. Independent nominations for any office, if signed by at least twenty Fellows having the right to vote, and received by the Recording Secretary not less than ten days before the Annual Meeting, shall be inserted in the call therefor, and shall be mailed to all the Fellows having the right to vote.

*See Chap. vi, art. 2.*

ARTICLE 5. The Recording Secretary shall prepare for use in voting at the Annual Meeting a ballot containing the names of all persons duly nominated for office.

## CHAPTER V.

### THE PRESIDENT.

ARTICLE 1. The President, or in his absence the senior Vice-President present (seniority to be determined by length of continuous Fellowship in the Academy), shall preside at all meetings of the Academy. In the absence of all these officers, a Chairman of the meeting shall be chosen by ballot.

ARTICLE 2. Unless otherwise ordered, all Committees which are not elected by ballot shall be appointed by the presiding officer.

ARTICLE 3. Any deed or writing to which the Corporate Seal is to be affixed, except leases of real estate, shall be executed in the name of the Academy by the President or, in the event of his death, absence, or inability, by one of the Vice-Presidents, when thereto duly authorized.

*See Chap. ii, art. 7; chap. iv, art. 1, 3; chap. vi, art. 2; chap. vii, art. 1; chap. x, art. 6; chap. xi, art. 1, 2; chap. xii, art. 1.*

## CHAPTER VI.

### THE SECRETARIES.

ARTICLE 1. The Corresponding Secretary shall conduct the correspondence of the Academy and of the Council, recording or making an entry of all letters written in its name, and preserving for the files all official papers which may be received. At each meeting of the Council he shall present the communications addressed to the Academy which have been received since the previous meeting, and at the next meeting of the Academy he shall present such as the Council may determine.

He shall notify all persons who may be elected Fellows or Foreign Honorary Members, send to each a copy of the Statutes, and on their acceptance issue the proper Diploma. He shall also notify all meetings of the Council; and in case of the death, absence, or inability of the Recording Secretary he shall notify all meetings of the Academy.

Under the direction of the Council, he shall keep a List of the Fellows and Foreign Honorary Members, arranged in their several Classes and Sections. It shall be printed annually and issued as of the first day of July.

*See Chap. ii, art. 7; chap. iii; chap. iv, art. 1; chap. x, art. 6; chap. xi, art. 1; chap. xii, art. 1.*

ARTICLE 2. The Recording Secretary shall have the custody of the Charter, Corporate Seal, Archives, Statute-Book, Journals, and all literary papers belonging to the Academy.

Fellows borrowing such papers or documents shall receipt for them to their custodian.

The Recording Secretary shall attend the meetings of the Academy and keep a faithful record of the proceedings with the names of the Fellows present; and after each meeting is duly opened, he shall read the record of the preceding meeting.

He shall notify the meetings of the Academy to each Fellow and by

mail at least seven days beforehand, and in his discretion may also cause the meetings to be advertised; he shall apprise Officers and Committees of their election or appointment, and inform the Treasurer of appropriations of money voted by the Academy.

After all elections, he shall insert in the Records the names of the Fellows by whom the successful nominees were proposed.

He shall send the Report of the Nominating Committee in print to every Fellow having the right to vote at least three weeks before the Annual Meeting.

*See Chap. iv, art. 3.*

In the absence of the President and of the Vice-Presidents he shall, if present, call the meeting to order, and preside until a Chairman is chosen.

*See Chap. i; chap. ii, art. 7; chap. iv, art. 3, 4, 5; chap. x, art. 6; chap. xi, art. 1, 2; chap. xii, art. 1, 3.*

ARTICLE 3. The Secretaries, with the Editor, shall have authority to publish such of the records of the meetings of the Academy as may seem to them likely to promote its interests.

## CHAPTER VII.

### THE TREASURER AND THE TREASURY.

ARTICLE 1. The Treasurer shall collect all money due or payable to the Academy, and all gifts and bequests made to it. He shall pay all bills due by the Academy, when approved by the proper officers, except those of the Treasurer's office, which may be paid without such approval; in the name of the Academy he shall sign all leases of real estate; and, with the written consent of a member of the Committee on Finance, he shall make all transfers of stocks, bonds, and other securities belonging to the Academy, all of which shall be in his official custody.

He shall keep a faithful account of all receipts and expenditures, submit his accounts annually to the Auditing Committee, and render them at the expiration of his term of office, or whenever required to do so by the Academy or the Council.

He shall keep separate accounts of the income of the Rumford Fund, and of all other special Funds, and of the Appropriation thereof, and render them annually.

His accounts shall always be open to the inspection of the Council.

ARTICLE 2. He shall report annually to the Council at its March meeting on the expected income of the various Funds and from all other sources during the ensuing financial year. He shall also report the names of all Fellows who may be then delinquent in the payment of their Annual Dues.

ARTICLE 3. He shall give such security for the trust reposed in him as the Academy may require.

ARTICLE 4. With the approval of a majority of the Committee on Finance, he may appoint an Assistant Treasurer to perform his duties, for whose acts, as such assistant, he shall be responsible; or, with like approval and responsibility, he may employ any Trust Company doing business in Boston as his agent for the same purpose, the compensation of such Assistant Treasurer or agent to be fixed by the Committee on Finance and paid from the Funds of the Academy.

ARTICLE 5. At the Annual Meeting he shall report in print all his official doings for the preceding year, stating the amount and condition of all the property of the Academy entrusted to him, and the character of the investments.

ARTICLE 6. The Financial Year of the Academy shall begin with the first day of April.

ARTICLE 7. No person or committee shall incur any debt or liability in the name of the Academy, unless in accordance with a previous vote and appropriation therefor by the Academy or the Council, or sell or otherwise dispose of any property of the Academy, except cash or invested funds, without previous consent and approval of the Council.

*See Chap. ii, art. 4, 5; chap. vi, art. 2; chap. x, art. 6; chap. xi, art. 1, 2, 3; chap. xii, art. 1.*

## CHAPTER VIII.

### THE LIBRARIAN AND THE LIBRARY.

ARTICLE 1. The Librarian shall have charge of the printed books, keep a correct catalogue thereof, and provide for their delivery from the Library.

At the Annual Meeting, as Chairman of the Committee on the Library, he shall make a Report on its condition.

ARTICLE 2. In conjunction with the Committee on the Library he shall have authority to expend such sums as may be appropriated by the Academy for the purchase of books, periodicals, etc., and for defraying other necessary expenses connected with the Library.

ARTICLE 3. All books procured from the income of the Rumford Fund or of other special Funds shall contain a book-plate expressing the fact.

ARTICLE 4. Books taken from the Library shall be receipted for to the Librarian or his assistant.

ARTICLE 5. Books shall be returned in good order, regard being had to necessary wear with good usage. If any book shall be lost or injured, the Fellow to whom it stands charged shall replace it by a new volume or by a new set, if it belongs to a set, or pay the current price thereof to the Librarian, whereupon the remainder of the set, if any, shall be delivered to the Fellow so paying, unless such remainder be valuable by reason of association.

ARTICLE 6. All books shall be returned to the Library for examination at least one week before the Annual Meeting.

ARTICLE 7. The Librarian shall have the custody of the Publications of the Academy. With the advice and consent of the President, he may effect exchanges with other associations.

*See Chap. ii, art. 6; chap. xi, art. 1, 2.*

## CHAPTER IX.

### THE EDITOR AND THE PUBLICATIONS.

ARTICLE 1. The Editor shall have charge of the conduct through the press of the Proceedings and the Memoirs, and all correspondence relative thereto, and shall have power to fix the price at which individual numbers of the Proceedings and Memoirs are sold.

ARTICLE 2. In conjunction with the Committee of Publication, he shall have authority to expend such sums as may be appropriated by the Academy for printing the publications and for defraying other expenses therewith connected.

ARTICLE 3. All publications which are financed in whole or in part from the income of the Rumford Fund or from the income of other

special funds, and all publications of work done with the aid of the Rumford Fund or other special funds, shall contain a conspicuous statement of this fact.

ARTICLE 4. Two hundred extra copies of each paper printed in the Proceedings or Memoirs shall be placed at the disposal of the author without charge.

If, on account of the number of communications offered for publication, it shall be necessary to decline for publication communications otherwise acceptable, members of the Academy shall be given preference in each of the several Classes over non-members; but whenever it shall be necessary to exercise this preference, the Editor shall inform the Council of the fact.

*See Chap. iv, art. 1; chap. vi, art. 3; chap. x, art. 6; chap. xi, art. 4.*

## CHAPTER X.

### THE COUNCIL.

ARTICLE 1. The Council shall exercise a discreet supervision over all nominations and elections to membership, and in general supervise all the affairs of the Academy not explicitly reserved to the Academy as a whole or entrusted by it or by the Statutes to standing or special committees.

It shall consider all nominations duly sent to it by any Class Committee, and act upon them in accordance with the provisions of Chapter III.

With the consent of the Fellow interested, it shall have power to make transfers between the several Sections, reporting its action to the Academy.

*See Chap. iii, art. 2, 3; chap. xi, art. 1.*

ARTICLE 2. Nine members shall constitute a quorum.

ARTICLE 3. It shall establish rules and regulations for the transaction of its business, and provide all printed and engraved blanks and books of record.

ARTICLE 4. It shall act upon all resignations of officers, and all resignations and forfeitures of Fellowship; and cause the Statutes to be faithfully executed.

It shall appoint all agents and subordinates not otherwise provided for by the Statutes, prescribe their duties, and fix their compensation. They shall hold their respective positions during the pleasure of the Council.

ARTICLE 5. It may appoint, for terms not exceeding one year, and prescribe the functions of, such committees of its number, or of the Fellows of the Academy, as it may deem expedient, to facilitate the administration of the affairs of the Academy or to promote its interests.

ARTICLE 6. At its March meeting it shall receive reports from the President, the Secretaries, the Treasurer, and the Standing Committees, on the appropriations severally needed for the ensuing financial year. At the same meeting the Treasurer shall report on the expected income of the various Funds and from all other sources during the same year.

A report from the Council shall be submitted to the Academy, for action, at the March meeting, recommending the appropriation which in the opinion of the Council should be made.

On the recommendation of the Council, special appropriations may be made at any Stated Meeting of the Academy, or at a Special Meeting called for the purpose.

*See Chap. xi, art. 3.*

ARTICLE 7. After the death of a Fellow or Foreign Honorary Member, it shall appoint a member of the Academy to provide a biographical notice for publication in the Proceedings.

ARTICLE 8. It shall report at every meeting of the Academy such business as it may deem advisable to present.

*See Chap. ii, art. 4, 5, 8; chap. iv, art. 1, 2; chap. vi, art. 1; chap. vii, art. 1; chap. xii, art. 1, 4.*

## CHAPTER XI.

### STANDING COMMITTEES.

ARTICLE 1. The Class Committee of each Class shall consist of the Vice-President, who shall be chairman, and the four Councillors of the Class, together with such other officer or officers annually elected as may belong to the Class. It shall consider nominations to Fellowship

in its own Class, and report in writing to the Council such as may receive at a Class Committee Meeting a majority of the votes cast, provided at least three shall have been in the affirmative.

*See Chap. iii, art. 2.*

ARTICLE 2. At the Annual Meeting the following Standing Committees shall be elected by ballot to serve for the ensuing year:

(i) *The Committee on Finance*, to consist of four Fellows, who, through the Treasurer, shall have full control and management of the funds and trusts of the Academy, with the power of investing the funds and changing the investments thereof in their discretion.

*See Chap. iv, art. 3; chap. vii, art. 1, 4; chap. x, art. 6.*

(ii) *The Rumford Committee*, to consist of seven Fellows, who shall report to the Academy on all applications and claims for the Rumford Premium. It alone shall authorize the purchase of books, publications and apparatus at the charge of the income from the Rumford Fund, and generally shall see to the proper execution of the trust.

*See Chap. iv, art. 3; chap. x, art. 6.*

(iii) *The Cyrus Moors Warren Committee*, to consist of seven Fellows, who shall consider all applications for appropriations from the income of the Cyrus Moors Warren Fund, and generally shall see to the proper execution of the trust.

*See Chap. iv, art. 3; chap. x, art. 6.*

(iv) *The Committee of Publication*, to consist of the Editor, *ex officio*, as Chairman, and four other Fellows, one from each Class, to whom all communications submitted to the Academy for publication shall be referred, and to whom the printing of the Proceedings and the Memoirs shall be entrusted.

It shall fix the price at which volumes of the publications shall be sold; but Fellows may be supplied at half price with volumes which they are not entitled to receive gratis.

It shall determine when the pressure of material offered for publication makes it necessary to give preference to members of the Academy as compared with non-members, or to give priority to certain members as compared with others, and to what extent this preference or priority shall be applied in each of the four Classes, to the

end that a proper balance of the facilities of publication with respect to subject matter and authors may be maintained.

*See* Chap. iv, art. 3; chap. vi, art. 1, 3; chap. ix; chap. x, art. 6.

(v) *The Committee on the Library*, to consist of the Librarian, *ex officio*, as Chairman, and four other Fellows, one from each Class, who shall examine the Library and make an annual report on its condition and management.

*See* Chap. iv, art. 3; chap. viii, art. 1, 2; chap. x, art. 6.

(vi) *The House Committee*, to consist of four Fellows, who shall have charge of all expenses connected with the House, including the general expenses of the Academy not specifically assigned to the care of other Committees or Officers.

*See* Chap. iv, art. 1, 3; chap. x, art. 6.

(vii) *The Committee on Meetings*, to consist of the President, the Recording Secretary, and four other Fellows, who shall have charge of plans for meetings of the Academy.

*See* Chap. iv, art. 3; chap. x, art. 6.

(viii) *The Auditing Committee*, to consist of two Fellows, who shall audit the accounts of the Treasurer, with power to employ an expert and to approve his bill.

*See* Chap. iv, art. 3; chap. vii, art. 1; chap. x, art. 6.

(ix) *The Committee on Biographical Notices*, to consist of six Fellows, two to be elected each year, six in 1933, one of them to be a Secretary of the Academy, to see that biographical notices of the Fellows are provided.

*See* Chap. x, art. 7.

ARTICLE 3. The Standing Committees shall report annually to the Council in March on the appropriations severally needed for the ensuing financial year; and all bills incurred on account of these Committees, within the limits of the several appropriations made by the Academy, shall be approved by their respective Chairmen.

In the absence of the Chairman of any Committee, bills may be approved by any member of the Committee whom he shall designate for the purpose.

*See* Chap. vii, art. 1, 7; chap. x, art. 6.

## CHAPTER XII.

## MEETINGS, COMMUNICATIONS, AND AMENDMENTS.

ARTICLE 1. There shall be annually eight Stated Meetings of the Academy, namely, on the second Wednesday of October, November, December, January, February, March, April, and May. Only at these meetings, or at adjournments thereof regularly notified, or at Special Meetings called for the purpose, shall appropriations of money be made or amendments of the Statutes or Standing Votes be effected.

The Stated Meeting in May shall be the Annual Meeting of the Corporation.

Special Meetings shall be called by either of the Secretaries at the request of the President, of a Vice-President, of the Council, or of ten Fellows having the right to vote; and notifications thereof shall state the purpose for which the meeting is called.

A meeting for receiving and discussing literary or scientific communications may be held on the fourth Wednesday of each month, excepting July, August, and September; but no business shall be transacted at said meetings.

ARTICLE 2. Twenty-five Fellows having the right to vote shall constitute a quorum for the transaction of business at Stated or Special Meetings. Eighteen Fellows shall be sufficient to constitute a meeting for literary or scientific communications and discussions.

ARTICLE 3. Upon the request of the presiding officer or the Recording Secretary, any motion or resolution offered at any meeting shall be submitted in writing.

ARTICLE 4. No report of any paper presented at a meeting of the Academy shall be published by any Fellow without the consent of the author; and no report shall in any case be published by any Fellow in a newspaper as an account of the proceedings of the Academy without the previous consent and approval of the Council. The Council, in its discretion, by a duly recorded vote, may delegate its authority in this regard to one or more of its members.

ARTICLE 5. No Fellow shall introduce a guest at any meeting of the Academy until after the business has been transacted, and especially until after the result of the balloting upon nominations has been declared.

ARTICLE 6. The Academy shall not express its judgement on literary or scientific memoirs or performances submitted to it, or included in its Publications.

ARTICLE 7. All proposed Amendments of the Statutes shall be referred to a committee, and on its report, at a subsequent Stated Meeting or at a Special Meeting called for the purpose, two-thirds of the ballot cast, and not less than twenty-five, must be affirmative to effect enactment.

ARTICLE 8. Standing Votes may be passed, amended, or rescinded at a Stated Meeting, or at a Special Meeting called for the purpose, by a vote of two-thirds of the members present. They may be suspended by a unanimous vote.

*See* Chap. ii, art. 5, 8; chap. iii; chap. iv, art. 3, 4, 5; chap. v, art. 1; chap. vi, art. 1, 2; chap. x, art. 8.

## STANDING VOTES.

1. Communications of which notice has been given to either of the Secretaries shall take precedence of those not so notified.

2. Fellows may take from the Library six volumes at any one time, and may retain them for three months, and no longer. Upon special application, and for adequate reasons assigned, the Librarian may permit a larger number of volumes, not exceeding twelve, to be drawn from the Library for a limited period.

3. Works published in numbers, when unbound, shall not be taken from the Hall of the Academy without the leave of the Librarian.

4. The Council, under such rules respecting nominations as it may prescribe, may elect as Associates of the Academy a limited number of men of mark in affairs or of distinguished service in the community.

Associates shall be entitled to the same privileges as Fellows, but shall not have the right to vote.

The admission fee and annual dues of Associates shall be the same as those of Fellows residing within fifty miles of Boston.

5. Communications offered for publication in the Proceedings or Memoirs of the Academy shall not be accepted for publication before the author shall have informed the Committee on Meetings of his readiness, either himself or through some agent, to use such time as the Committee may assign him at such meeting as may be convenient both to him and to the Committee, for the purpose of presenting to the Academy a general statement of the nature and significance of the results contained in his communication.

### RUMFORD PREMIUM.

In conformity with the terms of the gift of Sir Benjamin Thompson, Count Rumford, of a certain Fund to the American Academy of Arts and Sciences, and with a decree of the Supreme Judicial Court of Massachusetts for carrying into effect the general charitable intent and purpose of Count Rumford, as expressed in his letter of gift, the Academy is empowered to make from the income of the Rumford Fund, as it now exists, at any Annual Meeting, an award of a gold and a silver medal, being together of the intrinsic value of three hundred dollars, as a Premium to the author of any important discovery or useful improvement in light or heat, which shall have been made and published by printing, or in any way made known to the public, in any part of the continent of America, or any of the American islands; preference always being given to such discoveries as, in the opinion of the Academy, shall tend most to promote the good of mankind; and, if the Academy sees fit, to add to such medals, as a further Premium for such discovery and improvement, a sum of money not exceeding three hundred dollars.

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